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A Survey of Drafting-Room Practices

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*This analysis is the work of the Committee on Mechanical Drawing of the Michigan Industrial Education Society, and is approved by the Research Co-ordinating Committee of that Society.**

The purpose of this survey has been to determine the present prevailing practices in industrial drafting rooms of the Detroit area and thus form a basis of revised practices. The scope of the study was planned to be thorough and to cover several debatable practices. Although the survey was largely confined to the Detroit area, the diversified industries and the officials responsible for the responses make the results reliable for machine drawing everywhere.

The study was made by F. R. Kepler, Supervisor of Drafting, Detroit Public Schools, in co-operation with the committee consisting of Richard M. Carlson, Hutchins Intermediate, Detroit; D. A. Finger, Pattengill Junior High, Lansing; Archie P. Nevins, Central High, Kalamazoo; Edgar Roper, Walter French Junior High, Lansing; E. C. Russell, Director of Industrial Education, Pontiac, and Osborn Stapert, Emerson Junior High, Flint.

Questionnaires were sent to 175 firms. One hundred and eighteen responses were received representing 116 different industrial concerns, that being 66 per cent of those to whom the blank was sent. These responses were principally from cities in Michigan, 100 being from the Detroit area.

Responses were made by the following types of officials:

28 Chief draftsmen
25 Chief engineers
7 Assistant chief engineers
12 Engineers
10 Tool engineers, chief tool designers
8 Mechanical, body, appraisal, chassis, experimental, specifications engineers
3 Presidents
6 Assistant superintendents, general foremen, general managers, superintendents of manufacturing
4 Miscellaneous

Diversified industries are represented in the responses. The industries represented include: Airplanes, aluminum castings, artificial gas, automatic sealers, automobiles, automobile axles, bodies, cylinders, frames, hardware, lamps, motors, radiators, truck-body parts, bronze bushings and castings, bumpers, cam shafts, castings, patterns, stampings, carburetors, chain conveyors, chassis engineering cranes, doors, windows and steel sash, electric current, electrically welded pipe, engines, engineering, farm equipment, heating radiators, hydraulic and electrical machinery, jobbing machine shops, mechanical refrigerators, milling cutters and special tools, marine engineering, metal products, motor wheels, oil burners, precision parts for aircraft engines, pumps, railway maintenance screw-machine products, sheet-metal work, steam pumps, stampings, steering gears, stokers, tapping machines, telephone service, tires, tools, trailers, truck tractors, tubing, vacuum cleaners, valve and flat springs, ventilating equipment, water supply, windshields.

The generous co-operation of responsible officials in so large a proportion of manufacturing and engineering firms to whom the original blank on drafting-room practices was sent is gratefully acknowledged. The suggestions of H. D. Campbell, Drafting Instructor in the J. Sterling Morton High School, Cicero, Ill.; and G. G. Price, Director of Vocational Education, Battle Creek; E. M. Hall, Director of Part-Time School, Lansing; Harry Burnham, supervisor of Industrial Arts, Flint, and many others are acknowledged and appreciated.

In the following pages the statements or questions in the form which was used in the survey are found with several possible responses. Correspondents were asked to indicate their replies to each inquiry by writing in the letter which indicated their choice.

The following manufacturing and engineering firms co-operated in this survey of drafting-room practices:

Ainsworth Mfg. Co.
American Blamer Corp.
American Brass Co.
American Car & Foundry
American Electrical Heater Co.
American Radiator Co.
Barnes-Gibson-Raymond
Bohn Aluminum and Brass Co.
Bowen Products
Briggs Mfg. Co.
Brown-McLaren Mfg. Co.
Budd Wheel Co.
Buhl Aircraft Co.
Buhl Stamping Co.
Burroughs Adding Machine Co.
Cadillac Motor Co.
Chevrolet Motor Co.
Chicago Pneumatic Tool Co.
Chrysler Motor Corp.
Clayton & Lambert Co.
Commerce Pattern Foundry Co.
Continental Motor Corp.
Continental Tool Works
Copeland Products Inc.
Davis Tool and Eng. Co.
Department of Water Supply
Detroit Aircraft Corp.
Detroit City Gas Co.
Detroit Edison Co.
Detroit Lubricator Co.
Detroit Pump & Mfg. Co.
Detroit Screw Works
Detroit Street Railways
Detroit Tool Product Co.
Dietrich Incorporated
Dodge Brothers Motor Co.
Eastern Michigan Railways
Eclipse Interchangeable
Eureka Vacuum Cleaner Co.
Ever Hot Water Co.
Excello Tool & Mfg. Co.
Federal Mogul Corp.
Federal Motor Truck Co.
Fisher Body Co.

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Ford Motor Co.
Gar Wood Co.
Gemmer Mfg. Co.
General Motor Tool & Gauge Dept.
General Spring Pumper Corp.
Glenzer Co., J. C.
Goddard & Goddard Co.
Graham-Paige Motors Corp.
Gray Marine Motor Co.
Hall Lamp Co., C. M.
Handy Governor Corp.
Holcroft & Co.
Holley Carburetor Co.
Hoskins Manufacturing Co.
Hudson Motor Car Co.
Hupp Motor Car Corp.
Hutto Engineering Co.
Kelsey-Hayes Wheel Co.
Kelvinator Corp.
Kermath Mfg. Co.
LeBaron-Detroit Co.
Lincoln Motor Co.
Long Mfg. Co.
Mahon (R. C.), Co.
McCord Radiator Mfg. Co.
Michigan Bell Telephone Co.
Michigan Central Railroad
Michigan Tool Co.
Michigan Valve & Foundry Co.
Murray Corp. of America
National Twist Drill & Tool Co.
Norge Corp.
Northern Engineering Co.
Oakland Motor Car Co.
Packard Motor Car Co.
Palmer-Bee Co.
Pemberthy Injector Co.
Scott Valve Mfg. Co.
Scripps Motor Co.
Silent Automatic Corp.
Skinner Motors Inc.
Smith, Hichman and Grylls
Stinson Aircraft Corp.
Stout Engineering Laboratories, Inc.
Ternstedt Mfg. Co.
Thompson Prod. Inc.
Timken Detroit Axle Co., The
U. S. Radiator Corp.
U. S. Rubber Co.
Verville Aircraft Co.
Warner Aircraft Corp.
Whitehead and Kales Co.
Whitman and Barnes
Wolverine Tube Co.
Young Brothers Co.
Zenith-Detroit Corp.
Allis-Chalmers Mfg. Co.
American Steam Pump Co.
Baker-Perkins Co.
Clark Trucktractor Co.
Duplex P. P. Company
Grand Trunk Western R. R.
Johnson Automatic Sealer Co.
Motor Wheel Corporation
Novo Engine Co.
Olds Motor Works
Oliver Farm Equipment Co.
Reo Motor Car Co.
Riley Stoker Corp.
Smith Corp., A. O.
Studebaker Corp.
Union Steam Pump Co.

Following each statement is a table showing the responses which were made, the number of each, and the rounded per cent. The per cent in each case is based on the total number of replies made to the statement.

Drafting-Room Practices

A. Lettering

I. The lettering recommended for use on machine drawings is:
1. Vertical
2. Inclined only
3. Either vertical or inclined

Response	*No.*	*Per Cent*
1	22	19
2	48	41
3	47	40
None	1	

II. The lettering recommended for use on machine drawings is:
1. Capitals only
2. Capitals and lower case
3. Capitals and smaller capitals

Response	*No.*	*Per Cent*
1	73	64
2	7	6
3	33	29
1 or 3	2	2
None	2	2

III. If inclined letters are used, what approximate angle of inclination is recommended?
1. 75 deg.
2. 67½ deg.
3. 60 deg.

Response	*No.*	*Per Cent*
75 deg.	37	34
67½ deg.	25	23
60 deg.	20	28
60–70 deg.	1	1
60–67½ deg.	1	1
No importance	5	5
Vertical	9	8
None	9	

IV. What is the height of letters used in main titles?
1. ¼ in.
2. 3/16 in.
3. ⅛ in.

Response	*No.*	*Per Cent*
¼	34	29
3/16	46	40
⅛	23	20
5/32	2	2
¼–3/16	3	3
¼–⅛	2	2
Varies	6	5
None	2	

V. What is the height of letters used in subtitles?
1. 3/16 in.
2. ⅛ in.
3. 3/32 in.

Response	*No.*	*Per Cent*
3/16	22	20
⅛	60	52
3/32	19	17
3/16–⅛	3	3
⅛–3/32	1	1
7/64	3	3
¼	2	2
Varies	4	3
None	2	

VI. What is the height of letters used in notes?
1. 3/16 in.
2. ⅛ in.
3. 3/32 in.

Response	*No.*	*Per Cent*
3/16	8	7
⅛	56	48
3/32	40	35
7/64	4	3
3/32–7/64	8	7
None	2	

VII. The pen recommended for lettering notes is a
1. Gillott No. 303
2. Gillott No. 404
3. Tank pen
4. Ruling pen

Response	*No.*	*Per Cent*
1	28	28
2	12	12
3	5	5
4	31	31
1–2	1	1
1–4	3	3
2–4	2	2
Indiv. Choice	11	11
None used	7	7
None	18	

VIII. Is any kind of special device or guide for lettering used in your office?
1. For main titles only
2. For subtitles only
3. For all titles, notes, and dimensions
4. Never used

(Will you indicate which kind, if any.)

Response	*No.*	*Per Cent*
1	12	11
2	1	1
3	17	15
4	79	70
1–2	2	2
Optional	1	1
None	6	
Wrico	4	

Used for part numbers, charts, main titles, sectional letters

IX. The pencil recommended for lettering is
1. H
2. 2H
3. 3H
4. 4H
5. 5H
6. 6H

a) On detail paper

Response	*No.*	*Per Cent*
H	9	11
2H	24	31
3H	26	33
4H	11	14
2H – 3H	2	3
F–6H	6	8
None	40	

b) On plain bond paper

Response	*No.*	*Per Cent*
H	4	6
2H	37	52
3H	21	30
4H	5	7
H – 2H	1	1
2H – 3H	2	3
F – 6H	1	1
None	47	

NOTE: In this survey, tracing paper is used to designate a paper that has been sulphite treated; vellum, oil treated; bond paper, untreated.

c) On tracing paper

Response	*No.*	*Per Cent*
F–H	1	1
H	8	10
2H	50	61
3H	17	21
4H	1	1
H – 2H	3	4
2H – 3H	2	2
None	36	

d) On vellum

Response	*No.*	*Per Cent*
HB – H	1	1
H	10	11
2H	46	49
3H	23	25
4H	2	2
6H	1	1
H – 2H	3	3
2H – 3H	5	5
3H – 4H	1	1
4H – 5H	1	1
2H – 3H – 4H	1	1
None	24	

X. Are light penciled guide lines for the tops and bottoms of letters recommended?
1. Always drawn
2. Recommended
3. Not recommended

Response	*No.*	*Per Cent*
1	35	31
2	64	57
3	12	11
Bottom	1	1
None	6	

XI. When drawings are traced on cloth, are such penciled guide lines for the lettering drawn on the cloth?
1. Always drawn
2. Recommended
3. Not recommended
4. Master guide lines or "jig sheet" used under the cloth

Response	*No.*	*Per Cent*
1	28	26
2	45	42
3	12	11
4	11	10
1–2	2	2
1–4	3	3
3–4	1	2
2–4	4	4
None	12	

XII. Do you consider clear, well formed, uniform lettering essential on drawings?
1. Essential
2. Desirable
3. Not particular
4. Essential on production drawings only
5. Desirable for tool drawings only

Response	No.	Per Cent
1	60	51
2	45	39
3	None	
4	6	5
1–2	1	1
2–4	1	1
4–5	4	3
None	1	

B. Drawing Sheets

I. What is the basic size of your drawing sheets?
1. 6 by 9 in.
2. 8 by 10 in.
3. 8½ by 11 in.
4. 9 by 12 in.
5. 10 by 17 in.
6. 12 by 18 in.

Response	No.	Per Cent
6 by 9 in.	3	3
8 by 10 in.	2	2
8½ by 11 in.	30	27
9 by 12 in.	43	39
10 by 17 in.	None	
10½ by 15 in.	2	2
12 by 18 in.	6	5
8½ by 11–9 by 12 in.	1	1
8½ by 11–12 by 18 in.	2	3
24 by 36 in.	3	3
No standard	9	7
Basic sizes, no two alike	10	9
None	7	

II. Sheet sizes are indicated by
1. Number
2. Letter
3. Number and letter
4. Neither number nor letter

Response	No.	Per Cent
1	13	12
2	63	57
3	4	4
4	29	26
1–3	1	1
None	8	

III. Border lines are
1. Pen or pencil drawn
2. Printed

Response	No.	Per Cent
1	13	11
2	89	79
1–2	11	10
None	5	

IV. Title plates or strips are
1. Hand lettered
2. Printed
3. Rubber stamped
4. Combination of hand lettering and printing

Response	No.	Per Cent
1	7	6
2	65	56
3	10	9
4	20	17
2–3	11	10
2–3–4	1	1
3–4	2	2
None	2	

C. Drawing Practices

I. Product drawings are traced in ink on
1. Cloth
2. Tracing paper
3. Plain bond paper
4. Vellum

Response	No.	Per Cent
1	71	71
2	1	1
3	2	2
4	8	8
1–2	2	2
1–3	1	1
1–4	4	4
1–2–3	1	1
2–4	1	1
None	9	9
None	17	

Trace product drawings in ink, 92 firms, 91 per cent; 78 per cent of all

II. Product drawings are drawn with pencil only on
1. Tracing paper
2. Plain bond paper
3. Vellum

Response	No.	Per Cent
1	16	16
2	12	12
3	57	58
4	1	1
1–2	2	2
1–3	6	6
1–2–3	3	3
2–3	1	1
3–4	1	1
None	19	

III. Tool drawings are traced in ink on
1. Cloth
2. Tracing paper
3. Plain bond paper
4. Vellum

Response	No.	Per Cent
1	31	48
2	5	8
3	4	6
4	5	8
1–4	1	1
1–2–3–4	1	1
No ink	18	28
None	53	

Trace tool drawings in ink, 47 firms, 40 per cent of all

IV. Tool drawings are drawn with pencil directly on
1. Cloth
2. Tracing paper
3. Plain bond paper
4. Vellum

Response	No.	Per Cent
1	4	4
2	26	27
3	13	13
4	46	47
1–2	2	3
1–2–3	1	1
3–4	3	4
2–3–4	1	1
2–4	1	1
None	21	

V. Original product drawings on detail paper are
1. Always inked
2. Usually inked
3. Never inked
4. Sometimes inked

Response	No.	Per Cent
1	12	12
2	4	4
3	57	57
4	23	23
Pencil cloth	1	1
Detail paper not used	3	3
None	18	

Always, usually, or sometimes inked, 40 per cent

VI. Do you use the dull or glazed side of the tracing cloth?
1. Dull
2. Glazed
3. Either

Response	No.	Per Cent
1	95	87
2	7	6
3	5	5
Pencil cloth	1	1
No cloth	1	1
None	9	

VII. Indicate the grade (H, 2H, etc.) of the pencil used in the following kinds of work:
1. For drawing on detail paper

Response	No.	Per Cent
2H	19	21
2H – 3H	3	3
2H – 4H	3	3
3H	13	15
3H – 4H	3	3
4H	32	36
3H – 5H	1	1
4H – 5H	5	6
5H	2	2
4H to 6H	2	2
5H	4	5
2H up	2	2
None	29	

2. For drawing on plain bond paper

Response	No.	Per Cent
H	2	3
2H	25	36
H – 3H	1	1
2H – 3H	2	3
3H	16	23
2H – 4H	1	1
3H – 4H	5	7
4H	16	23
2H – 6H	1	1
4 – 6H	1	1
No answer or bond not used	48	

3. For drawing on tracing paper

Response	No.	Per Cent
F – 2H	1	1
H	7	9
H – 2H	2	3
2H	27	35
2H – 3H	6	8
2H – 4H	1	1
3H	22	29
3H – 4H	1	1
4H	10	13
No answer	41	

4. For drawing on vellum

Response	No.	Per Cent
F	1	1
H	5	5
F–H	1	1
H – 2H	3	3
H – 3H	1	1
2H	27	27
2H – 3H	9	9
H – 2H – 4H	1	1
2H – 4H	3	3
3H	33	33
3H – 4H	1	1
4H	14	14
3H to 5H	1	1
No answer	18	

VIII. For drawing on detail or on plain bond paper, the pencil is sharpened to
1. Chisel edge
2. Long conical point

Response	No.	Per Cent
1	33	32
2	48	46
1–2	23	22
None	14	

IX. For drawing on tracing paper or vellum, the pencil is sharpened to
1. Chisel edge
2. Long conical point

Response	No.	Per Cent
1	32	29
2	69	54
1–2	18	16
Optional	1	1
None	7	

X. Is the ruling pen used for lettering dimensions and notes and inking arrowheads?
1. Allowed
2. Recommended
3. Not recommended
4. Never used for the purpose

Response	No.	Per Cent
1	48	45
2	17	16
3	21	20
4	19	18
1–2	1	1
Optional	1	1
None	11	

One recommends the ruling pen for letters but not for arrowheads. The ruling pen is allowed and recommended by 65 or 61 per cent.

XI. With what are inked lines and blots on tracing cloth erased?
1. Good grade of pencil eraser
2. Ink eraser having grit in it
3. Knife or steel eraser
4. Combination of pencil eraser and steel eraser
5. Combination of ink eraser and steel eraser
6. Erasing machine

Response	No.	Per Cent
1	56	55
2	5	5
3	6	6
4	21	20
5	3	3
6	5	5
1 and 2	3	3
1–2–3	1	1

1–6	2	2
Glass	1	1
Any	1	1
None	12	

XII. Are shade lines used in drawings?
1. Always
2. Usually
3. Never
4. Sometimes

Response	*No.*	*Per Cent*
1	1	1
2	1	1
3	70	60
4	44	38
None	2	

XIII. Drawings and tracings are made in
1. Two weights of line
2. Three weights of line
3. More than three weights

Response	*No.*	*Per Cent*
1	66	59
2	41	36
3	5	4
One weight	1	1
None	5	

XIV. Drawings are made in what angle of projection?
1. Third angle
2. First angle
3. Either acceptable

Response	*No.*	*Per Cent*
1	78	71
2	12	11
3	19	17
2–3	1	1
None	8	

XV. Product drawings show the several parts
1. On separate sheets
2. On the same sheet which may be cut up and distributed
3. On the same sheet which is not cut
4. Any one of the above methods acceptable

Response	*No.*	*Per Cent*
1	75	67
2	5	5
3	14	13
4	9	8
1–3	5	5
1–4	2	2
3–4	1	1
None	7	

XVI. Toolroom drawings show the several details
1. On the same sheet
2. On separate sheets
3. Either way acceptable

Response	*No.*	*Per Cent*
1	46	46
2	8	8
3	46	46
None	18	

XVII. Toolroom drawings show the materials, number required, heat treat, etc.
1. With each detail
2. On a bill of material on the same sheet
3. On a separate attached sheet
4. In a space provided in title block

Response	*No.*	*Per Cent*
1	62	63
2	9	9
3	2	2
4	10	10
1–2	8	8
1–4	3	3
1–2–4	3	3
1–3	1	1
None	20	

XVIII. Product drawings show materials, number required, finish, heat treat, etc.
1. With each detail
2. In a bill of material on the same sheet
3. On a separate attached sheet

Response	*No.*	*Per Cent*
1	75	67
2	11	10
3	10	9
1–2	8	7
1–3	8	7
None	6	

One firm reports that the number required is not shown with each detail.

XIX. Pattern numbers are based on
1. Part numbers
2. Separate series
3. Both numbers and series

Response	*No.*	*Per Cent*
1	68	63
2	26	24
3	7	7
4	1	1
1–2	1	1
1–3	1	1
Tool No. 1, No. 2, etc.	1	1
No standard	3	3
None	10	

XX. The part for which a tool, jig, or fixture is made is shown by
1. Red ink or pencil lines
2. Black ink or pencil lines
3. No drawing of the part

Response	*No.*	*Per Cent*
1	56	58
2	14	15
3	18	19
1–2	2	2
1–3	2	2
2–3	1	1
No standard	3	3
None	22	

XXI. A washer or similar piece is shown
1. By one view and a note giving thickness
2. By two views
3. Either way acceptable

Response	*No.*	*Per Cent*
1	8	7
2	39	35
3	60	55
2–1	1	1
1–3	1	1
2–3	1	1
None	8	

XXII. What form of lines used to show the periphery of a gear?
1. Heavy solid line
2. Light solid line
3. Light dash line
4. Medium dash line

Response	*No.*	*Per Cent*
1	20	18
2	12	11
3	42	40
4	29	28
1–4	1	1
2–3	1	1
2–4	1	1
None	12	

XXIII. Are the profiles of gear teeth drawn?
1. Not drawn
2. Only a few teeth shown
3. All teeth accurately drawn

Response	*No.*	*Per Cent*
1	32	30
2	64	60
3	1	1
1–2	9	8
1 usually 2 sometimes	1	1
None	11	

D. Assembly Drawings

I. On assembly drawings screw threads are represented
1. By the naturalistic method
2. By the conventional method
3. No form of representation

Response	*No.*	*Per Cent*
1	11	10
2	85	75
3	6	5
1–2	9	9
2–3	1	1
None	5	

II. Are dimensions given on assembly drawings?
1. Over-all and for travel, clearance, etc.
2. No dimensions given

Response	*No.*	*Per Cent*
1	94	82
2	17	15
When essential	3	3
None	4	

III. Are invisible edges shown on assembly drawings?
1. All shown
2. Principal ones
3. None

Response	*No.*	*Per Cent*
1	6	5
2	93	82
3	14	12
2–3	1	1
None	4	

IV. All but the more simple assemblies show
1. Elevations with hidden edges
2. Sectional assemblies
3. Both hidden edges and sectional views
4. Either acceptable

Response	*No.*	*Per Cent*
1	6	6
2	29	27
3	21	19
4	52	48
None	10	

V. Are detail, or reference numbers used on assembly drawings?
1. Always used
2. Never used

Response	*No.*	*Per Cent*
1	100	88
2	12	11
Usually	1	1
Sometimes	1	1
None	4	

E. Scales

I. The scale of a drawing is expressed as
1. Half size
2. 6″ = 1′—0″

Response	*No.*	*Per Cent*
1	62	57
2	42	39
1–2	5	4
None	9	

II. Are machine and tool drawings in your organization commonly made 1½, 3, 6, or 12 in. to the foot, and twice or four times actual size? Check the scales used.

	Response
1. 1½ to the foot or eighth size	34
2. 3 in. to the foot or quarter size	56
3. 6 in. to the foot or half size	77
4. 12 in. to the foot or full size	93
5. 24 in. to the foot or twice size	41
6. 48 in. to the foot or four times size	19

III. Is the scale of drawing indicated on the sheet?
1. Always indicated
2. On detail drawings only
3. On assembly drawings only
4. Never indicated

Remarks:

Response	*No.*	*Per Cent*
1	92	81
2	8	7
3	2	2
4	4	4
Usually	1	1
indicated on enlarged views	1	1
Other than full size	5	4
None	5	

F. Sections

I. What is the form of the section line used to show where a section view is taken?
1. Dashes separated by a single dot of the same weight as visible outlines
2. ½-in. dash lines, lighter than outlines
3. Solid line, heavier than outlines
4. ½-in. dash lines, heavier than outlines
5. Light continuous line

6. Light dashes separated by two dots
7. Light dashes separated by single dot with heavy corners

Response	*No.*	*Per Cent*
1	22	20
2	7	6
3	26	23
4	23	20
5	20	18
6	3	3
7	5	5
1–3	2	2
1–4	1	1
2–3	1	1
2–4	1	1
7–5	1	1
None	6	

II. Which way do arrowheads at the end of a section line point?
1. Toward the section
2. Away from the section
3. Arrows not used

Response	*No.*	*Per Cent*
1	92	82
2	9	8
3	7	6
1–2	1	1
1–3	3	3
None		

III. Are invisible edges shown behind the plane of section?
1. Always
2. Never
3. Only when clearness demands

Response	*No.*	*Per Cent*
1	3	3
2	8	7
3	100	89
No rule	1	1
None	6	

IV. How do you indicate various materials in section?
1. A.S.M.E. symbols
2. S.A.E. symbols
3. Standard symbols with note
4. Uniform crosshatching with note
5. Given in bill of material

Response	*No.*	*Per Cent*
1	16	14
2	15	13
3	22	20
4	20	18
5	20	18
1–5	2	2
1–4–5	1	1
2–3	1	1
2–4	2	2
2–5	1	1
3–5	4	4
4–1	2	2
4–1–2	1	1
4–5	3	3
No standard	1	1
None	6	

V. How many forms of crosshatchings are used to indicate materials?
1. Only one
2. 2 to 5
3. 6 to 10
4. 11 to 20
5. More than 20

a) On tool drawings

Response	*No.*	*Per Cent*
1	18	22
2	45	55
3	10	12
4	2	3
5	1	1
1–2	2	3
1–4	1	1
3–2	1	1
Standard lines	1	1
No standard	1	1
None	36	

b) On product drawings

Response	*No.*	*Per Cent*
1	24	25
2	40	42
3	20	21
4	7	7
5	1	1
1–4	1	1
1–2	2	2
Standard lines	1	1
None	22	

VI. How many widths of crosshatch lines are used?
1. Only one
2. Two
3. Three
4. Four or more

Response	*No.*	*Per Cent*
1	69	63
2	28	25
3	4	4
4	5	5
Varies	3	3
Standard	1	1
None	8	

VII. What kind of line do you use to indicate where an elevation ends and a section begins?
1. Center line
2. Solid line

Response	*No.*	*Per Cent*
1	42	38
2	64	58
1 or 2	2	2
By heavy irregular line	1	1
None	8	

G. Notes

I. Notes are
1. Underlined
2. Not underlined

Response	*No.*	*Per Cent*
1	77	66
2	31	27
1–2	8	7
None	2	

II. In what position are notes placed?
1. Always horizontally
2. At an angle
3. Horizontally usually, but vertically when space is otherwise limited

Response	*No.*	*Per Cent*
1	56	48
2	1	1
3	60	51
None	1	

III. The abbreviation used for diameter is
1. D
2. Dia
3. Either D or Dia
4. DIAM
5. None

Response	*No.*	*Per Cent*
1	5	4
2	71	61
3	27	23
4	4	4
5	6	5
2–4	2	2
Any	1	1
None	2	

IV. The abbreviation used for radius is
1. R
2. RAD
3. Either R or RAD
4. None

Response	*No.*	*Per Cent*
1	71	61
2	16	14
3	30	26
None	1	

V. In each group below, please indicate the form preferred
1. Tapped hole
a) ½"—13 tap NC–2
b) ½"—13 tap Amer C–2
c) 27/64 (.4218) drill, chamfer 45 to ½" diam. ½—13 American threads, $\frac{.4500}{.4552}$ P.D.

Will you indicate any other form used?

Response	*No.*	*Per Cent*
a	49	49
b	13	13
c	17	17
a–b	2	2
a–c	1	1
b–c	1	1
Diam. pitch drill gauge	1	1
Tap, P.D. 13/32 drill	1	1
½ tap	1	1
¼ x 28 thread	1	1
½ U.S.S.	6	6
½—13 tap	2	2
½—13	1	1
No standard	1	1
None	18	18

2. Threaded rod
a) 13 U.S.S. Thds. per in.
b) ½"—13NC Thds. per in.
c) 13 AM–C–2 Thds. per in.

Response	*No.*	*Per Cent*
a	47	47
b	35	35
c	4	4
a–b	1	1
b or ½—13 U.S.S.	1	1
5/16—18NC thread P.D. .2764–.2760	1	1
Pitch diam.	1	1
½—13 U.S.S.	3	3
½—13 Thread	5	5
½—13 U.S.S. thread	1	1
No standard	1	1
None	18	

3. Countersunk hole
a) # 11 drill (.191) and c'sink for # 10–24 flat-head machine screw
b) # 11 drill (.191) 82 c'sink .3026 diameter

Response	*No.*	*Per Cent*
a	64	59
b	38	35
a–b	3	3
a tool *b* Prod	1	1
Miscel.	3	3
None	9	

4. Metal gauge
a) .125 (# 11 U.S.S. Gauge)
b) # 11 U.S.S. Gauge (.125)

Response	*No.*	*Per Cent*
a	21	19
b	86	78
a–b	1	1
# 22 (.031) U.S.S. Gauge	2	2
None	8	

5. Drilled hole
a) 1" drill 3 holes
b) Drill 1" 3 holes

Response	*No.*	*Per Cent*
a	91	80
b	20	18
1" drill three holes	1	1
3–1" drill	1	1
None	5	

6. Cast hole
a) 1" core
b) 1" cast
c) 1"

Response	*No.*	*Per Cent*
a	97	86
b	3	3
c	8	7
a–b	3	3
a–c	1	1
None	6	

7. Number or letter drill
a) # 25 drill (.1495)
b) .1495 in. (# 25 drill)
c) # 24 drill
d) Drill .1495

Response	*No.*	*Per Cent*
a	79	73
b	3	3
c	16	15
d	7	6
# 25 (.1495) Drill	1	1
Drill # 25 (.1495)	2	2
21/64 drill	1	1
None	9	

H. Finish, Fits, and Tolerance

I. Are such words as drill, ream, counterbore, countersink, etc., used on drawings to indicate tool operations?
1. Always in connection with drawing
2. Never used

Response	*No.*	*Per Cent*
1	105	94
2	3	3
1–2	1	1
Simple operation only	1	1
No standard	1	1
None	6	

II. Are machine-finish marks repeated on all views?
1. Always repeated
2. Recommended for clearness
3. Not recommended

Response	*No.*	*Per Cent*
1	52	45
2	56	49
3	4	4
1–2	1	1
No standard	1	1
None	4	

III. Do you place finish marks on finished surfaces shown by hidden edge lines?
1. Only on visible edges
2. On hidden edges only when necessary
3. Section view made on which finish marks are made

Response	*No.*	*Per Cent*
1	24	21
2	63	55
3	11	10
1–2	5	4
1–3	4	4
2–3	2	2
No standard	2	2
None	7	

IV. How do you distinguish between rough and smooth machine finish?

Response	*No.*	*Per Cent*
Note	35	48
Tolerance	5	7
F	3	4
Rough Smooth	2	3
Always smooth	2	3
f for R		
ff for S	3	4
Miscel's	14*	19
No standard	7	10
None	45	

*One each of fourteen different forms reported

V. If a machine or tool part is to be machine finished all over, the note is made in what form?
1 *f*A.O.
2. F. A. O.
3. *f* all over
4. Finish all over

Response	*No.*	*Per Cent*
1	2	2
2	17	15
3	10	8
4	76	67
2–4	4	4
3–4	2	2
All	1	1
No standard	2	2
None	4	

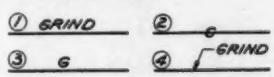
VI. On product drawings, fits are specified
1. In decimal dimensions with limits
2. By such words as running, press, slip, etc.

Response	*No.*	*Per Cent*
1	99	88
2	7	6
1–2	5	5
No standard	1	1
None	6	

VII. On tool drawings, fits are specified
1. In decimal dimensions with limits
2. By words as running, press, slip, etc.

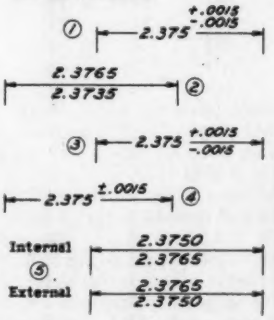
Response	*No.*	*Per Cent*
1	54	55
2	25	25
1–2	16	16
Dec. dim. no limit	1	1
None	1	1
No standard	2	2
None	19	

VIII. Surfaces to be ground are indicated thus:



Response	*No.*	*Per Cent*
1	7	6
2	45	41
3	9	8
4	33	30
1–3	1	1
1–2	1	1
1–4	6	5
2–4	7	6
3–4	1	1
No standard	1	1
None	7	

IX. Decimal limits or tolerances are shown as at:



Response	*No.*	*Per Cent*
1	16	14
2	15	14
3	20	18
4	25	23
5	12	11
1–2	2	2
1–3	1	1
1–4	2	2
1–5	1	1
2–3	2	2
2–4	1	1
2–5	2	2
3–4	2	2
3–5	2	2
3–4–2	1	1
4–5	1	1
All	1	1
Full tolerance	1	1
Smaller always above	1	1
No standard	3	3
None	7	

J. Screw Threads, Bolts and Nuts

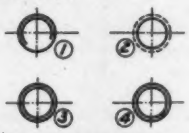
I. What nomenclature is used in specifying standard threads?
1. American National Coarse and Fine Thread
2. U.S., S.A.E., and A.S.M.E.

Response	*No.*	*Per Cent*
1	29	25
2	76	66
1–2 or No standard	5	4
U.S.S. U.S.F.	6	5
None	2	

II. Do you plan to adopt the American National thread nomenclature?
1. Yes
2. No

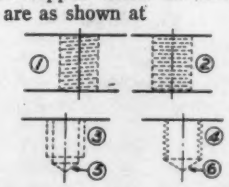
Response	*No.*	*Per Cent*
1	22	24
2	36	39
For certain work	1	1
Not at present	1	1
Undecided	7	8
No standard	1	1
Now used	25	27
None	25	

III. Tapped holes in plan are as shown at:



Response	*No.*	*Per Cent*
1	6	5
2	95	86
3	4	4
4	1	1
1–2	2	2
2–3	1	1
No standard	1	1
None	8	

IV. Tapped holes in elevation are as shown at

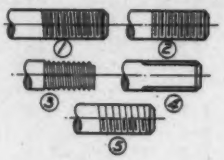


Response	*No.*	*Per Cent*
1	24	22
2	19	17
3	37	34
4	15	14
1–2	1	1
1–3	6	5
1–3–4	1	1
2–3	2	2
3–4	3	3
No standard	2	2
None	8	

V. The bottoms of tapped holes in elevation are as shown in IV at:

Response	*No.*	*Per Cent*
5	67	66
4	29	28
5–4	6	6
None	16	

VI. Screw threads are as shown at:



Response	*No.*	*Per Cent*
1	43	43
2	22	22
3	5	5
4	8	8
5	2	2
1–2	3	3
1–3	8	8
1–4	2	2
2–3	2	2
2–4	2	2
1–2–3	1	1
1 or	1	1
No standard	1	1
None	17	

K. Dimensions

I. In our organization, dimensions are:
1. Repeated on different views
2. Repetition not permitted
3. Repeated for clearness only

Response	*No.*	*Per Cent*
1	5	4
2	53	47
3	54	47
1–3	1	1
2–3	1	1
None	4	

II. Are all dimensions based either on center lines or on finished surfaces?
1. Yes
2. No

Response	*No.*	*Per Cent*
1	94	86
2	12	11
Varies as required	3	3
No answer	9	

III. Dimensions to hidden edges are:
1. Not permitted
2. Permitted

Response	*No.*	*Per Cent*
1	56	51
2	54	49
None	8	

IV. In dimensioning, the needs of what department are given preference?
1. Engineering
2. Inspection
3. Machine
4. Assembly
5. Pattern, die, or pressroom
6. Combination of

Response	*No.*	*Per Cent*
1	4	4
2	1	1
3	20	19
4	None	
5	2	2
6	51	46
1–3	5	5
1–2–3	1	1
1–3–5	1	1
1–4–3	1	1
2–3	5	5
2–3–4	1	1
3–4	5	5
3–5	3	3
No preference	6	6
None	12	

V. Are inch marks used with dimension figures?
1. Always used
2. Never used when all dimensions are used in inches

Response	*No.*	*Per Cent*
1	37	32
2	77	67
Seldom if ever	1	1
None	3	

VI. Feet and inches are expressed as:
1. 5′ 7″
2. 5—7″
3. 5 ft. 7″
4. 5 Ft. 7 in.
5. 67″ (5′—7″)

Response	*No.*	*Per Cent*
1	58	54
2	1	1
3	5	5
4	4	4
5	26	24
1–4	2	2
3–4	1	1
4–5	2	2
In. only	7	7
No standard	1	1
None	11	

VII. Feet and fractions of an inch are expressed as:
1. 8′—⅜″
2. 8′—0—⅜″
3. 8 Ft. ⅜″
4. 8 Ft.—0—⅜″
5. 8 Ft. ⅜ In.

Response	*No.*	*Per Cent*
1	20	20
2	36	37
3	8	8
4	8	8
5	10	10
1–3	1	1
3–5	1	1
In. only (96.375–1; 96 ⅜–1)	13	13
No standard	1	1
None	20	

VIII. Dimensions are expressed in inches up to:
1. 12
2. 24
3. 36
4. 48
5. 60
6. 72
7. 84
8. 96
9. 108
10. 120
11. 132
12. 144
13. No limit

a) On product drawings

Response	*No.*	*Per Cent*
1	11	10
2	11	10
3	3	3
4	3	3
5	4	4
6	2	2
9	1	1
10	1	1
12	2	2
No limit	70	64
No standard	1	1
None	9	

b) On tool drawings

Response	*No.*	*Per Cent*
1	10	11
2	11	12
3	2	2
4	3	3
5	4	5
6	3	3
8	1	1
9	1	1
10	1	1
12	2	2
No limit	52	57
No standard	1	1
None	27	

IX. How are dimension figures placed?
1. To read from the bottom or from the right
2. All to read from the bottom only (fractional line always horizontal, parallel to bottom of sheet)

Response	*No.*	*Per Cent*
1	93	82
2	16	14
Optional	4	4
None	5	

X. Fractions are made:
1. One and a half times as high as the whole number
2. Twice as high

Response	*No.*	*Per Cent*
1	94	82
2	25	22
No standard	5	4
None	4	

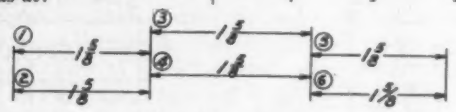
XI. Over-all dimensions are:
1. Always used
2. Generally used
3. Not recommended
4. Sometimes

Response	*No.*	*Per Cent*
1	74	65
2	36	31
3	1	1
4	3	3
None	4	

XII. A drill, or bolt, circle is dimensioned
1. By its diameter
2. By its radius
3. By either

Response	*No.*	*Per Cent*
1	76	66
2	1	1
3	35	31
None	6	

XIV. Dimension figures are placed as at:

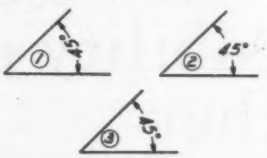


Response	*No.*	*Per Cent*
1	97	85
2	None	
3	2	2
4	1	1
5	1	1
6	2	2
1–3	3	3
1–4	2	2
1–5	1	1
1–6	4	3
No standard	1	1
None	4	

XIII. Arrowheads are made as at:

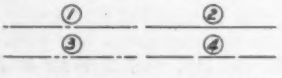
Response	*No.*	*Per Cent*
1	42	37
2	52	46
3	11	10
1–2	2	2
3–2	1	1
Optional	1	1
2 modified	1	1
No standard	2	2
None	6	

XV. Dimension figures of angles are placed as shown at:



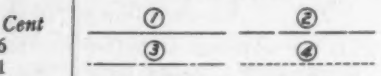
Response	*No.*	*Per Cent*
1	3	3
2	94	80
3	10	9
1–2	2	2
2–3	6	5
Either or no standard	2	2
None	1	

XVI. The form of dimension line used is that shown at:



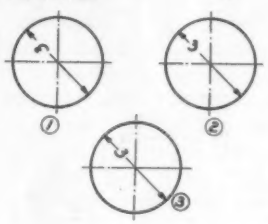
Response	*No.*	*Per Cent*
1	108	94
2	1	1
3	5	4
1–2–3	1	1
None	3	

XVII. The form of center line used is that shown at:



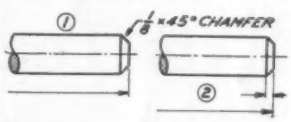
Response	*No.*	*Per Cent*
1	93	80
2	5	4
3	8	7
4	1	1
1–2	4	4
1–3	3	3
1–3–4	1	1
None	3	

XVIII. The position of a dimension figure to show a diameter across a circle is as shown at:



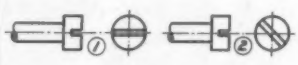
Response	*No.*	*Per Cent*
1	5	5
2	69	63
3	25	22
1–2	1	1
1–3	1	1
2–3	8	7
Seldom given across circle	1	1
None	8	

XIX. The preferred method of dimensioning a rod is as shown at:



Response	*No.*	*Per Cent*
1	96	83
2	14	12
1–2	3	3
1–45 deg. 2–all others	2	2
None	3	

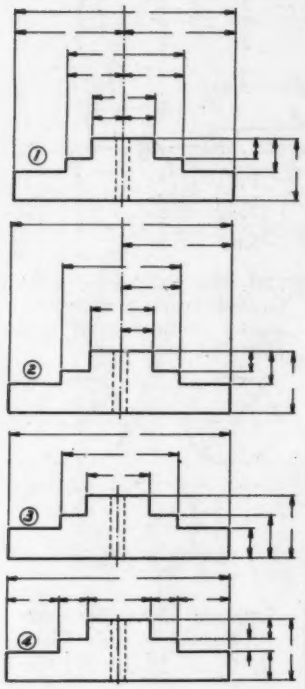
XX. The method of indicating the screw-driver slot in a filister head screw is as shown at:



Response	*No.*	*Per Cent*
1	67	60
2	35	32

1–2	8	7
No standard	1	1
None	7	

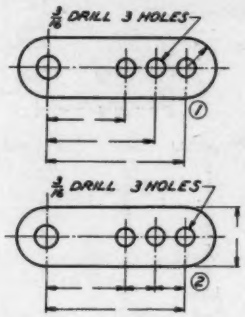
XXI. The preferred method of dimensioning a mating piece is as shown at:



Kesponse	*No.*	*Per Cent*
1	15	13
2	65	57
3	20	18
4	4	4

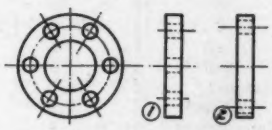
1–2	3	3
1–3	2	2
1–4	1	1
3–4	3	3
None	5	

XXII. The preferred method of dimensioning a machine part is as shown at:



Response	*No.*	*Per Cent*
1	67	61
2	35	32
1–2	7	6
1–accurately 2–ordinary	1	1
None	8	

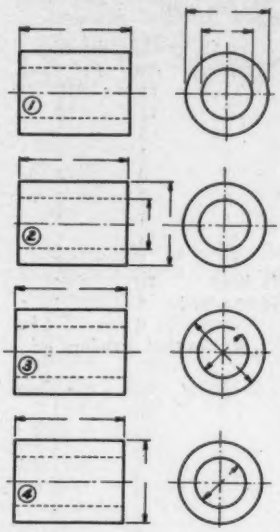
XXIII. The preferred method of showing the side elevation is as shown at:



Response	*No.*	*Per Cent*
1	70	63
2	40	36

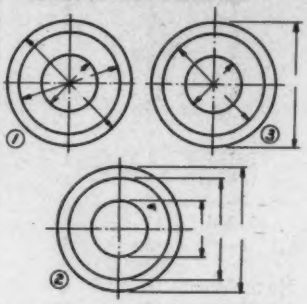
1–2	1	1
None	7	

XXIV. The preferred method of dimensioning a cylinder is as shown at:



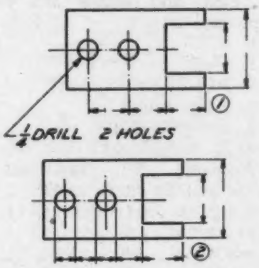
Response	*No.*	*Per Cent*
1	68	60
2	17	15
3	1	1
4	10	9
1 or 2	13	11
2 or 1	1	1
1 or 3	1	1
1–4	1	1
2–4	1	1
None	5	

XXV. The preferred method of dimensioning concentric circles is that shown at:



Response	*No.*	*Per Cent*
1	8	7
2	92	82
3	5	5
1 or 2	2	2
1 or 3	1	1
2 or 3	3	3
None	6	

XXVI. The preferred method of dimensioning a rectangular block through which holes are drilled is as shown at:



Response	*No.*	*Per Cent*
1	112	100
2	None	
None	6	

A Responsibility of the Industrial-Arts Teacher

Thomas Diamond

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From a paper read before the Industrial-Arts Education group on Friday morning, December 6, 1935, at the A.V.A. convention in Chicago, Illinois.

In this discussion no attempt has been made to offer solutions for the problems touched upon. It is merely an effort to review some of the social and economic changes with which we are all familiar. The questions raised have not been studied scientifically; however, there seems to be nothing to prevent us from spending a few minutes today speculating on them.

The interest in social and economic problems has been steadily increasing during the past decade. This interest has been stimulated by the need for economic and social adjustment which has been thrust upon everyone during the recent depression. In view of this, it may be worth while to examine our changing world, and to reflect briefly on what may be done about it in our schools in general, and particularly in the departments of industrial arts.

Not only have teachers become acutely conscious of the changes, but every thinking citizen in the country has been attempting to discover methods of properly meeting them. If these efforts are to be successful, every individual and every group in society must co-operate.

Since this must be a co-operative effort it seems pertinent to inquire of the teachers of industrial arts, not only "How can the school contribute to the solution?" but also "How can the work in industrial arts be made to function in any program proposed by the school?" In order to aid us in our consideration of the question, let us look at some of the changes that have taken place.

Insofar as economic conditions are concerned, society has been compelled to modify its beliefs considerably. In the first place, our faith in the infallibility of our banks has been seriously affected. No longer do we quote the banker as an authority on investments, and it is feared that many of us still have some misgivings when we find ourselves in the position where we are able to make a humble deposit in the bank. During the past few years, many people have lost all of their life savings, and have been compelled to depend upon their relatives to care for them, when they were fortunate enough to have relatives who could and would assume the responsibility. These losses have given rise to a feeling that it is futile to make any effort to provide for one's old age. Thus we have developed a feeling of hopelessness on the part of our older people and a cynical attitude toward saving on the part of those who are younger.

This condition must be counteracted by the schools, and the teachers must redirect the attention of young people anew toward the value of thrift. The vital difference between investment and speculation must be pointed out, as well as the relationship between high and low returns, and the probable safety of a security. In the light of our recent experiences, this may be considered by some to be futile. However, one of the characteristics of man is that he rises above disaster and rebuilds what has been torn down. The period of reconstruction is here and the schools must do their part in the process of rehabilitation.

Another change which has affected the thinking of many citizens is the trend toward the concentration of productive enterprise into the hands of a relatively small number of corporations. There is a growing dissatisfaction with this tendency on the part of many citizens, with the result that we have share-the-wealth programs being proposed by many different individuals and groups.

Somewhere in our school program we must provide our future citizens with a philosophy which will enable them to appreciate the reasons for the concentration of effort in larger units. They should be made to understand also that any redistribution of wealth is likely to react to the disadvantage of society in general, and will certainly stifle the application of the individual initiative which is one of the pillars upon which our present high standard of living has been built.

There are those who may feel that it is borrowing trouble to introduce topics of this kind into the school, but we have a feeling that a young person who has been led to do some elementary thinking on such questions will be much better able to combat the "isms" that afflict society, than one who is permitted to go out into life without such preparation. Furthermore, if the present conditions are undesirable and must be changed, it is these young people who will provide the leadership during the change. If they have been thinking of and discussing desirable changes in our social order, there is a greater probability that their leadership will be wise.

Not only have present conditions disturbed the thinking of many people but they seriously affect the opportunities for a young person to start a business of his own and increase his difficulty when he reaches the point where he must decide upon his future vocation. This emphasizes the need for vocational guidance. The industrial-arts teacher is in a particularly strategic position to aid in this activity. His shop is a laboratory in which various fields of work may be explored and he has unlimited opportunities to supplement his instructions during his informal contact with the pupils. Regardless of the existing organization set up in a school system for providing guidance, all teachers are responsible for guiding their pupils. This applies particularly to the teacher of industrial arts since he is concerned with the materials, methods, and processes in common use in the world of work.

We find, too, that there is an increasing reluctance on the part of employers to engage people who are under 18 years of age. Paralleling the development of this attitude, legislation has been enacted which makes it almost impossible for young people under eighteen to secure employment of any kind. The effect of this on society has been quite marked. Under these conditions, children under 18 are confronted with just two alternatives; they must continue in school or, where the law permits it, they may roam the streets of the city.

Those who are planning to go to college constitute only a small proportion of those who remain in school. Then, too, the candidates for higher education present a relatively simple problem to those responsible for the school curriculum. The others, who have no desire to go to college, who lack the ability to do college work, or who lack the means to pay for it, have caused school authorities to consider ways and means of making the time spent profitable.

Since there is a decided tendency toward keeping young people out of employment, and since many of these young people are thereby induced to remain in school after they would normally have gone to work, it is believed that specific vocational classes should be provided for them. The training given in these classes should not be a narrow preparation for one of the common trades, but rather should it be broad in its scope in order that the student may be able to adapt himself to the conditions he will find in a constantly changing industrial world.

What the nature of this vocational work should be, has been indicated by still another change which has been going on in society. More and more as time passes the tendency is to subdivide the operations on a job until each individual is responsible for only a minute part of the product. The result of this has been that the number of semiskilled workers has increased with vastly greater rapidity than the number of all-round mechanics. This has created a situation in which the greater number of operations a man masters, the more desirable he becomes. If, then, we assume the responsibility in our industrial-arts department of providing opportunities for vocational training, we must see to it that the units of instruction are so arranged that a young man may acquire skill in as many complete units as can be covered in the time he stays in school.

We must remember, too, that the training of a worker involves more than the acquisition of skill. The development of the right attitudes toward work, toward the employer, and toward the fellow worker is equally important and may well be stressed by the industrial-arts teacher in his efforts to train young people for work.

We are told by statisticians that the number of people in the country who are over 65 has increased. In other words, there seems to be a tendency toward lengthening the span of life of the average citizen. This fact suggests that still greater emphasis will have to be placed upon adult education. The industrial-arts teacher should have his share in work of this kind, and he should be constantly on the alert to meet the needs of this type of education as they become apparent. We know also that there is a tendency on the part of many employers to avoid hiring anyone who has passed the age of 45. Thus we have a condition in which the number of people over 65 is increasing, while the age at which a person is considered to be unemployable is steadily decreasing below that age.

Society has become conscious of this condition and has become concerned about the problem of how these unemployables may be cared for. Some states have attempted to solve it by introducing old-age-pension schemes in varying forms, but the country, apparently, is not yet ready for such legislation on a federal basis. In view of the existing conditions, however, it seems certain that some method of providing security for older people must be introduced sooner or later. If this is true, our young people should be made to realize the need for such action. They should be made to see that such assistance should not be given on a charity basis, but should be in the form of insurance to which the individual contributes during his active years, and which he receives, later on, as a right rather than as a gift.

The introduction of labor-saving machinery has caused another problem to arise. This change has so speeded up production that we can produce goods faster than they are consumed. This has caused employers to limit the working hours per week to about one half of what they were a few years ago. This limitation of the working day has provided the worker with increased opportunities for leisure-time activities. The school then must become active in stimulating interest in hobbies and in organizing adult groups to pursue them in our schools.

In addition to those who may be interested in hobbies, there may be some who are seeking an opportunity to prepare for a new occupation or to extend their skill or knowledge in their present one. This sounds like vocational education and, as a matter of fact, it is, but it is a type of work that ought to be done regardless of whether or not the cost is reimbursed from the Smith-Hughes fund.

Since the adult of today is being given more and more time for leisure, it is reasonable to suppose that the young of today will have at least as much leisure. Since this is likely to be the case, it behooves us to stress more than we have been doing the development of hobbies as one of the objectives in our industrial-arts curriculum.

The emphasizing of hobbies in our work entails the provision of a wider variety of activities than is found in most industrial-arts shops. It means broadening still further the idea of the general shop to include any activity which can be carried on in a shop and in which there is an interest. It means also that we must abandon the notion that shop activity must be confined to those types of work which we in our wisdom have seen fit to introduce. We must rid ourselves of the notion that we know what a boy should be interested in, and give more weight to the idea that he has interests of his own. With this in mind, we shall have to diminish the amount of teacher domination and extend still further than we have done the opportunities for self-expression and self-realization.

Since most leisure-time activities will be carried on in the home, it is imperative that the industrial-arts teacher modify his ideas concerning machines and equipment, and emphasize more firmly the idea of handwork. It is true that this reversion to hand methods seems to ignore the fact that machines are used in industry, but it should be kept in mind that in developing interest in hobbies, we are not preparing people for industry. Only teachers who possess hand skill themselves and who have the courage to maintain high standards of work can hope to do justice to this phase of education for leisure.

The greater ability to produce has caused us to produce more than we have been able to buy. The unconsumed goods have backed up on our producing machinery with the result that the machines have become idle and are likely to remain so until the consumer has been provided with a greater buying power. This condition is not a temporary one, but is likely to become more apparent as human ingenuity makes still greater substitutions of mechanical power for man power. If the cumulative effectiveness of this lack of balance is to be overcome, a more equitable distribution of our national income must be made.

It is not suggested here that school people are in a position to supply the answer to the question of how incomes may be increased. It is believed, however, that some effort might be made in school to convince young people that the principle is sound that wages cannot be increased at will without a corresponding increase in production, that every increase in wages means an increase in the cost of the article made unless there is a corresponding saving somewhere to balance the expenditure. This saving is usually accomplished by each man doing more work or the work being done by fewer men.

This does not mean that we must dig into the profound theories of economics, nor need we consider the debatable question of how much profit a manufacturer should be allowed, but fundamental nondebatable truths might be discussed in an effort to develop an understanding of them on the part of our young people.

In our efforts to meet this problem, we shall have to reduce still more our emphasis on the project as an end in itself and increase our emphasis on using the project as a means of teaching some of the social and economic principles we believe to be sound. As an illustration of this, we might consider the humble but popular bread board. This has considerable value as a project, as it introduces the pupil to the task of planning a board. He may learn also why it is more desirable to use it when cutting bread than to use the top of the piano or of the kitchen sink. It is probable, too, that he may learn how to compute the number of board feet in it in order that he may be assessed appropriately before he takes it home.

It is not suggested that the bread board be taken off the list of projects but it is believed that it could be used more effectively as a means of teaching some of the things which we believe ought to be taught. For example, what does it cost to make a bread board, not merely in time and material, but also in the light, heat, power, and rent it absorbs? The tools and equipment used, the teacher's salary, and the scrap material must also be considered, and we find that, if all we get out of the process is a bread board, it becomes an extremely expensive piece of kitchen equipment. This enables us to emphasize the fact that we expect the pupil to get something else out of making the board which we believe makes up for the apparently high costs.

From this it is an easy step to a discussion of quantity production. Further consideration of the question will reveal why in the commercial world some things are made in large quantities and what factors make this procedure desirable.

This might be followed by a discussion of what is necessary to make quantities of bread boards. This raises the questions of capital, management and labor, and their relative importance in a co-operative effort to produce bread boards at a price within the reach of the patron of the dime store.

If we are to get the full educational value out of the bread board, we must go still further in our discussion with the youngsters. They discover that, while they pay ten cents a foot for the wood, the manufacturer who buys in carload lots may get it for less than a third of that price. This means that the material cost may be as low as two cents in each board. They discover, also, that, with the aid of machines and by skillful management, boards can be turned out so fast that the time cost on each one may be as low as a fraction of a cent.

This leads to the discovery that the total cost for time and material is less than three cents, and yet when they propose to buy one, it costs ten cents. Obviously the conclusion must be that someone is making a profit of seven cents on an article that can be made for three. If the young people are to avoid the erroneous conclusion that someone is profiteering, they must be shown that such things as light, heat, power and rent do not come, like the angels, from heaven. They must be paid for and the cost deducted from the seven cents. The question of management, selling, and interest on investment should also be brought to their attention in order that they may fully appreciate what overhead cost really includes. If the industrial-arts teacher can get even a slight appreciation of some of these questions from the bread boards he can feel that it has justified its presence in his list of projects.

It is feared that to many of our industrial-arts teachers, the addition of the aforementioned related information might be too much trouble, as they are more concerned about the technique displayed by their pupils as they laboriously rasp their material into a shape which approximates the one suggested on the blueprint. However, if we are to do our part in enlightening young minds in regard to the problems which are facing us today, we must recognize that the bread board by itself is unimportant as an objective in industrial arts.

But, someone says, all this takes time and we have only 50-minute periods. The only reply to this is that if we cannot teach those social and economic principles which we believe need to be taught, and at the same time make a bread board, we should cut out the bread board.

In other words, teachers of industrial arts must find ways and means of using their projects to teach fundamental social and economic ideas. In order to be able to do this, they must themselves appreciate what these ideas are. When they have this appreciation, and when they can really feel that they are teaching children the things we believe they can learn from the industrial arts, then, and then only, will the subject we represent gain the place in the sun to which it is justly entitled.

Some shop teachers have not realized the importance of presenting to young people the ideas suggested here. Some have not been convinced that the task is part of their responsibility. And still others have not had the type of training that would enable them to do it if they had been awakened to its desirability. This is not entirely the fault of the teacher, as a teacher usually tends to teach what he has been taught. For this reason, it is believed that those responsible for the training of teachers should examine themselves and their curricula for the purpose of discovering the extent to which they are training teachers to use the industrial arts as a medium through which to train young people to think intelligently on the social and economic problems with which we are faced, and which, in all probability, they will have to solve.

In view of this, it behooves us to consider ways and means of accomplishing this new objective. It means that the training of our teachers must include courses in sociology and economics which are more closely related to the everyday problems of life than those to which we are accustomed. It is not suggested that we change our present interest in using the industrial arts of printing, woodworking, and metalworking as aids in broadening the outlook of our pupils. Rather must we hold to what we have been doing and to it add all these other things. Let us not become too complacent and assume that because we have been doing a good job, therefore the job will continue to be good. If we are to avoid sinking still further into the valley of disrepute we must bestir ourselves. We must co-operate with other social agencies in an effort to prepare a generation of young people to take up the responsibility of living in a society which must assume the burden of solving the social and economic problems which, up to the present, have baffled their elders.

There are those who will maintain that these questions are outside the province of the educator, but they do constitute definite problems for which our future citizens must be prepared. Since these questions will be encountered in the business of living, those who are concerned with the preparation of young people for that business must take the questions into consideration when planning their training programs. This means that it is a concern of the teacher — not of the teacher of industrial arts particularly, but of every teacher. The fact that it seems difficult to fit material of this kind into the curriculum does not constitute evidence that it should not be taught. It means, rather, that the curriculum is wrong and needs to be revised and, if necessary, totally destroyed. There should be nothing sacred about a curriculum which does not contain the things which the facts of life indicate are of fundamental importance.

We have said that all this is the teacher's job — not particularly the teacher of civics, of history, of economics, or of any other specific subject; it is a task which must be assumed by everyone concerned with education. This, of course, includes the teacher of industrial arts. It is his responsibility to see that he makes opportunities for instructing his young charges in the problems suggested here. When this can be done through the projects made by his students, it should be done. When it seems impossible, then some other way must be found by which it may be done.

Industrial Arts Meets the Challenge

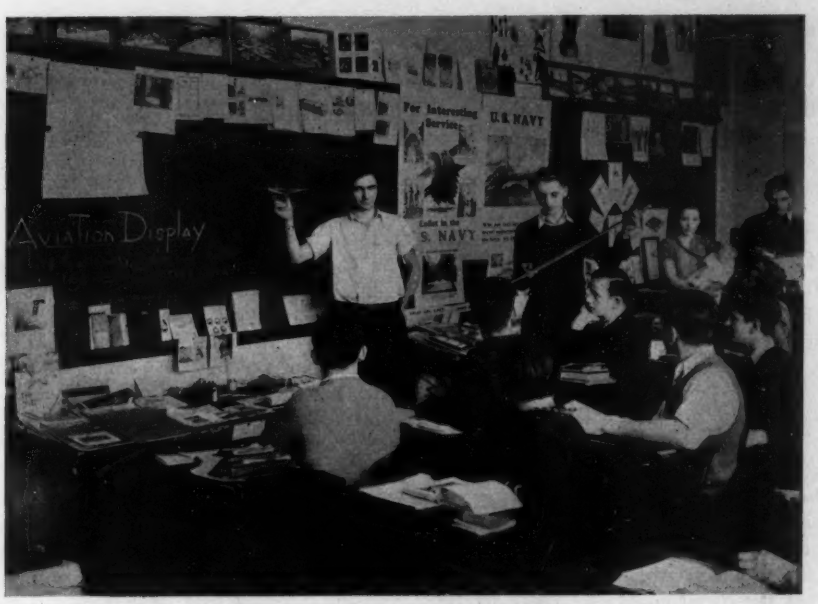
Frederick J. Moffitt

Superintendent of Schools,
Hamburg, New York

The industrial-arts teacher is told what his responsibilities are by a school superintendent.

The educational skies are clearing. The thunderings of unrepresentative minorities no longer crash so loudly around the American schoolhouse and the sun of clear thinking is beginning to shine through the storm.

The schools of the nation are facing the greatest period of growth and expansion in their history. This is no pollyanna doctrine to bolster up the flagging courage of those who have felt the brunt of the storm. It has nothing to do with politics or national elections. It is a historical truth, that after every period of depression, the public schools of America have risen with renewed vigor. Everywhere in the past five years, one sees the evidence piling up that the citizens of the democracy have held firmly to their fundamental belief that education is the warp and woof of their democratic ideals. It takes more than



Industrial arts touches the entire school through student displays and demonstrations. In answer to the question, "What shall I do?" the industrial-arts instructor says, "Find out what there is to do"

five years of economic suffering to destroy the deep-seated conviction of a people that public education must and shall go forward.

But during those five years of depression, the schools have taken a thorough beating. Gloss it over with fine-sounding slogans such as "conservative retrenchment" or "meeting the emergency," the fact remains that in many communities school budgets have been slashed to unreasonable limits and building programs have been delayed to the point of criminal negligence. The children of America have been denied the educational opportunities which were won for them in hard-fought battles of the past.

In the field of industrial arts, this beating has been even more severe than in many of the other branches of education. The rank and file of the workers in industrial arts have taken much of the brunt of the hysterical attack. Weakened by lack of support from school administrators and the public when such support was most needed, many of the teachers in the industrial-arts field became confused and ready to accept in part the defeatist programs which came with the economic upheaval.

The present time, then, demands a frank facing of facts, a review of the mistakes made in the past few years and a fighting determination to meet the issues which lie ahead. Problems more grave than any presented as a result of limited budgets and lack of understanding are facing the industrial-arts worker at the present time. He is challenged as never before by the events of today and tomorrow.

In the sociological and economic changes that have taken place during the past few years, in the overpowering demand for more and more "practical" education, in the spectacular rise of adult education, in the extra-governmental agencies that have been created and in the demands of the leaders of the new type of education, lies a striking challenge to the instructor in industrial arts.

How will he meet these new conditions? How adapt himself to new demands? How stretch a limited budget to cover additional equipment? How offer a full measure of service to the "new" school? These are some of the questions which must be answered and answered immediately.

Too long has the instructor in industrial arts been content to accept the place in the school curriculum which was reluctantly carved out for him two decades ago. Too often has he entered the school through the back door. In the past his teaching has often been thought of as one more frill condoned by an overgenerous board of education or an ambitious school executive. It has been placed on the same plane as the old-fashioned "busywork" — something to keep youngsters out of mischief in the same way that the teacher used to pass out building blocks to the little folks to quiet their protesting squirms against an intolerable school routine. It was a stopgap until such time as the undeveloped brain might become capable of assimilating the regular academic subjects.

Education is well known for its conservative attitudes. The theory of transfer of training held the schoolmaster in thrall for many years. The study of Greek for all the children of all the people gave way but slowly before the onslaughts of child psychology. Industrial-arts teaching must have been a daring innovation, indeed, in the cultural scheme of education. Too many industrial-arts instructors have been nursed on that old concept of "faculty psychology" in their formative years to

The aviation club is the center of interest for boys of all ages. The work of the aviation club correlates with the general course of study. Assembly demonstrations and contests add to the enjoyment of club members

disavow it openly now. They may see with their own eyes the tremendously significant changes in the character of the school population; they may witness the sociological changes inside the school and out, but they think still of their own chosen field as merely supplementing the work of the school. They do not see it as a motivating force that should orient the whole school program.

John Dewey saw the vision years ago when "manual training" was a new catchword to be bandied about from the school platform. John Dewey enunciated and made clear the philosophy which should be the guiding star of the industrial-arts teacher of today.

We are going slowly back to the ideals of John Dewey in order to go forward to the reality of the "new" school. We are going back thirty years to his original conception of activities in the school. The activities program and industrial-arts program are of the same material. The instructor in industrial arts cannot afford to sit passively by while the whole school world takes his material and uses it to rebuild an outworn curriculum. He himself must take a vital part in the rebuilding. He must assume a large part of the leadership in the change.

In our forward progress, the instructor in industrial arts, be he purely a "high-school" teacher or bound by administrative plans to the junior high school only, must think in terms of the whole school program. The work of the fifth-grade pupils in their various activities must command his attention. The kindergarten must have his active sympathy and co-operation. He can never again be tucked away in one corner of the school labeled "Industrial-Arts Department." His department is the whole school. The materials requisitioned by the grade teacher in her earnest, if somewhat puzzled, attempt to build an activities program, should have his attention. This is no attempt to seize any prerogatives of the purchasing department, for that department is in dire need of help. A harassed superintendent will lean on the industrial-arts teacher with enthusiasm if he can obtain counsel in any phase of the new program.

The hobby club finds its chief joy in using the facilities of the industrial-arts department. A demonstration such as this is more convincing to the patron of the school than all the selling talk ever written

The activity program is bound up by necessity with the work in industrial arts. It needs the sane guidance which the instructor in vocational education can suggest. By training and inclination he must be a leader in the new school program.

This "new" movement in manual activity throughout the school is leading to new visions of education. The industrial-arts teacher must help to steer the way toward definite goals.

But that is not all — the industrial-arts leader needs to reformulate his educational philosophy to meet new conditions. In a few short years he has seen the population of the high school double and redouble. He has seen arbitrary scholastic standards sink lower and lower in spite of the worried efforts of the school executive. He has seen a new type of pupil come to his class. The boys from the factory and the farm have entered the school in increasing numbers. Some of them have come willingly with happy faces content that they were to have a new chance because the job outside had dwindled away. Some have come sullenly and with a "show me" attitude because the law of the land has reached into their lives and said must.

The school executive, too, has pondered over the surprising increase. The classes in Latin and algebra have attempted to absorb hundreds of newcomers with indifferent success. In desperation the superintendent sends these

No matter how small the school, the printshop is bound to pay dividends in satisfaction as well as special skills

new groups to the industrial-arts department and again the old cry goes up: "Give them 'busywork' else they will tear down the discipline of the school."

But woe betide the instructor in industrial arts who thinks that "busywork" is the answer to the problem that confronts him. The problem is much more complex. These boys who are in school today are coming back tomorrow, and with them in increasing numbers are coming the children who, because of insufficient training, have been denied a place in the world outside the schoolroom.

New pupils, yes; but more money, no! The school executive has not yet been convinced that he can spend money on new equipment and build up expensive new courses of study. The workman cannot make bricks without straw but someway, somehow, the leader in the industrial arts must do the job. That is part of the challenge that is thrown to him today.

Where are we going to start? Some leaders in the field are embarking upon a guidance program which will bring to each child knowledge of the place that must be made for him in the world outside. Such leaders have talked in terms of guidance ever since their jobs began. Sometimes, in discouragement, they have felt the need of guidance to be more imaginary than real. With the school population of a decade ago fairly on its way to college there was little to be done in guiding pupils toward objectives already fixed by home and school. but this startling change in the type of pupil entering school has brought home the fact that guidance of some new kind is absolutely essential.

Larger schools can afford to set up their own departments of guidance with testing programs and all of the measuring instruments that properly go with a scientific piece of work. But in the vast majority of schools, guidance must, of necessity, be largely vocational guidance and there is no teacher in the system who is as well fitted to undertake it as the instructor in industrial arts. Thus to the old-fashioned "manual-training" department comes the latest word in "fads." With budgets cut to the bone, with classes crowded beyond all reasonable standards, new work is added.

There is a thrill in the new situation. Industrial arts is coming into its own. We may be making mistakes. We may be assuming work that was never meant to be crowded into an industrial-arts schedule. We may be going far afield and piling up grief and trouble for ourselves. But the fact remains that we are going definitely forward. We are taking a commanding place in the school of tomorrow. We are meeting the new problems which confront education and are helping fight the battle of the boy who has never had his rightful chance in school.

A diversified program in industrial arts is the answer to the problem of overcrowded classrooms. Photo Hamburg Public Schools, woodworking shop

Industrial-arts authorities tell us that we must expand our courses; that we must diversify our offerings; that we must build for character and manliness as well as teach the specific skills. All these things the industrial-arts teacher is doing — and more. He is guiding education toward the ideal set up by John Dewey and Horace Mann. He is becoming a force with which to be reckoned in the education of tomorrow.

"How are the teachers of industrial arts going toward this goal?" asks the Board of Education of the smaller system, whose members are not quite clear as to the place industrial arts must play in the plans for the future.

"How are you going to evolve new plans when the school budgets have been cut and the school executive is on his toes to squeeze the last bit of value out of every penny?" asks the interested and hopeful school patron.

These are questions which challenge the leader in industrial arts. He has seen the vision of where he must go in order to help the children of the post-depression period. The question of ways and means looms up to cause him misgivings.

The trickle of budget money which may have come to him regularly during the past ten years has, in many instances, been halved and quartered. Equipment has not been kept up to the desired standard. New courses which were planned have been disapproved by higher authorities and the instructor is struggling to hold his own in the face of larger classes and more demands.

"The best defense is an offense." "In case of doubt, attack." These military maxims may be trite, but they have won many a battle. They seem to be peculiarly pertinent to the industrial-arts situation today. School authorities have written and spoken a great deal about informing the public of the demands of the school and bringing the present situation home to the school patrons. It is a phase of educational leadership which cannot be overemphasized. The general public must be told of the modern program in industrial arts. They must be told in no uncertain terms the objectives toward which that program is pointed and the results which are expected. It is not within the scope of this discussion to enter into an evaluation of ways in which to do this job. Yet every leader in industrial arts must make plans to enlist the support of the public. Every parent-teacher association should understand the work that is being done in industrial arts and guidance. Every taxpayers' association should be asked to appoint a committee to investigate the possibilities in the present-day program of industrial arts. The school authorities, responsible for allocating the funds with which the school is run, should be clearly shown the importance of the industrial-arts program as an integral part of the educational planning for the future. We must educate the patrons of the school and we must win new support.

In the meantime, are the children, who have recently been thrown into

school, going to be forced into a curriculum which is largely based on college-entrance requirements? Are they going to dawdle through the years becoming more and more discouraged in facing a situation set up in the light of needs of the school population of ten or fifteen years ago? Are industrial-arts leaders going to disavow their responsibilities because of their own lethargy or discouragement?

This is no time for a defeatist attitude. It is certainly no time for compromise. In case of doubt, attack! If classes are crowded beyond a convenient limit, the curriculum must be remade overnight and room found to absorb the extra burden. If the course of study is too complicated for the new students, it must be re-evaluated in terms which will fit the existing situation.

The whole industrial-arts program must be enriched. Methods must be found to take care of new situations. The instructor in industrial arts must needs search his equipment to see that every bit of it is carrying its full load. New classroom devices must be tried. Extracurricular plans must be formulated. Somehow or other the burden must be met until a more and more understanding school board comes forward with assistance.

It is encouraging to the educational observer to see what answer is being made by the men in the field. Diversified courses of study have sprung into being; crafts clubs have been organized; leisure-time activities have been planned, and in many communities the industrial-arts department of the school has been taking the lead in an attempt to find answers to the problems.

The industrial-arts leader can no longer be bound by the confines of the school shop. The school assembly has his sympathetic support. The "stage carpenter's club" whose business it is to make stage properties, to handle the lighting effects on the school stage, to erect scenery, to attend to the hundred and one odd jobs which go with an assembly production, has become his pride and joy. The handicraft club blooms in the smile of his approval and the softball league, drawn largely from boys who have returned to find a strangely altered school, is a pet hobby. The industrial-arts teacher is guiding, counseling, advising. He is making the power of the industrial-arts department felt in the entire school and in the whole community. He is making himself indispensable to the whole school. "Selling the industrial-arts program" is part of his work, to be sure. Enriching the program, vitalizing the curriculum, interpreting the activities work in his job also. "All of this program means more work," objects the laggard. "We are overcrowded and underpaid at the present time. With public appreciation at a low ebb, why should we deliberately lay ourselves open to rebuff by adding new duties to our schedule?" Why, in other words, are we going to accept the challenge?

The worker in industrial arts entered his chosen field because he saw a vision of something new in education. He may have enjoyed the school of yesterday with its work in the field of history and of languages, yet he felt the urge "to do" as well as the urge "to be." He felt that books alone were only part of the educative process; that the school should be motivated by work with hand and brain allied; that character was not formed by precept as much as by example. He saw the vision of children happy and busy with work which created the desire to do worth-while things in the world.

For the sake of the new era toward which America has already pledged herself, the schools of the country must, perforce, assume new burdens. For the sake of the children of America who face new problems and strange adjustments, a program of new activities must come into existence.

The age of too much leisure time is not around the corner — it is here. The age of sociological and technological change is not an academic fancy of the future — it exists. Leaders in education are doing their best to meet the changed civilization. If the industrial-arts program is as sound and purposeful as its adherents claim, it will meet gladly the challenge of today.

The Three Degrees in Industrial Education

Dr. Homer J. Smith

Professor of Industrial Education, University of Minnesota, Minneapolis, Minnesota

A paper read as part of the Epsilon Pi Tau Fraternity program held in connection with the Chicago Convention of the American Vocational Association, December, 1935.

Our topic is an engaging one, because all present have interest in this subject and may be said to represent practically every avenue of approach to its consideration. Many of us have been awarded degrees. Some of us desire degrees that we do not now possess. We wonder about the worth of the effort and about where to enroll for advanced preparation. Some who have earned degrees question the good they have done to date in increase of salary, responsibility, or prestige. Some of us control degree programs and are concerned about requirements. Others question whether their institutions should "step up" the level of training and as to what plans would be best.

Those among us here tonight, without degrees, need not be uneasy. They could not be identified by any process of observation yet devised. A man does not look as though he had or had not earned a degree or any certain degree. If we were followed to our homes and watched for a week at our work, the observer would find difficulty in making degree distinctions among us. Fine and useful as degrees are, their possession is not reflected, with any high measure of certainty, either in personal appearance or in perfection of work.

Yes, the chairman has devised a topic and a program for which we have background. He has employed a theme about which all of us have interest and opinion. This paper is a

record of opinion, a series of conclusions based upon relationship to degree problems from several points of view. The speaker wishes to avoid being thought to be presuming or dogmatic; he states only opinion. No study has been made, no evidence is offered, no references are cited.

Historical Aspects of Degrees

I wish there were time to revel in the historical phases of our topic. If you like to read of the past, if you seek a good thesis project, consider tracing the development of academic and professional degrees through the centuries. A moment will be well spent in sampling what you would find. The earliest concept of a degree was that it licensed the holder to teach in a University. In medieval times there were three degrees, as to level, designated *the baccalaureate, the licentiate,* and *the doctorate.* Strictly speaking, the first or baccalaureate was not a degree, because it did not confer the right of public teaching. Insofar as education is concerned, therefore, we began with two rather than with three degrees and this is very interesting in view of recent American recognition of a fourth-degree level.

In the Middle Ages, the right to confer degrees was granted by the pope, who was recognized as head of all universities. Later, in England, under Henry the Eighth, the Archbishop of Canterbury was permitted to confer but his awards never carried the weight of Oxford and Cambridge. Degrees are not at present the same in all countries and those of the same name are not equivalent throughout the world. There are nations wherein the doctor's degree is comparable to our master's, and other countries where the doctorate means much more of extended work and scholarly training than we associate with it in America. Degree requirements and connotations have never been stable nor fixed which fact suggests that future changes are not precluded. It is our opportunity to plan for the years ahead, keeping in mind the ultimate good of our profession and of its several specialties.

The current terms *bachelor, master,* and *doctor* have interesting histories. *Bachelor* has meant, in succession, a cowherd or farm servant, a lowly worker in a monastery, a probationer for knighthood. The term did not signify a degree until the thirteenth century and then it meant a university rank rather than a level or stage of training completed. With us, today, it is a recognition of preparation, general or specific, for high-plane living and for professional service. (In civil life I suppose it means probationer for matrimony, rather than unmarried man. If this be true, *master* probably means that the man is no longer a candidate, that he has entered upon important work, but that he is still on probation.) If there were time it would be pleasant to review the meanings of the second and third terms in the series. We would be interested in what these have meant as compared with what they now mean. We know that the second or master's degree is obsolete in some countries and that it is skipped by many students in our own. We could consider the logic of honorary awards, and the fact of their inconsistence in names of degrees granted rather than in choices among persons of eminence. There is great temptation to linger on these conditions and lessons of the past. How much better it would be if more of our current problems were approached in the light of their histories!

Even among our present three levels of degrees the names are in much confusion. It is to be regretted that we issue dozens of different first degrees and many of the two advanced types. It is even more discomforting that we make awards out of keeping with student interests and their subject patterns. There are bachelors of arts who know little of the arts; there are masters of science without much scientific instruction or attitude; there are doctors of philosophy whose complete school records do not contain any formal courses in logic, ethics, or religion. Shall we not work toward more consistence in this naming of degrees, in the field of our special interest?

It would seem to be of advantage to us in education if all first degrees were to be of the same name and without field designation. Perhaps, we should exclude the bachelor of arts as being too general or academic, and as not being representative of any given type of employment. But, why not bachelor of science for all first-degree workers in education, regardless of their areas of specialization? To do otherwise, such as to use the term "bachelor of education," forces the creation of degree names for all other service fields. (Bachelor of education, bachelor of architecture, bachelor of business administration, bachelor of music, bachelor of nursing, and so on, to a hundred.) If we go further and use the term "Bachelor of science" in industrial education we shall soon need half a hundred more degree names to match the divisions of educational work. (Home-Economics education, secondary-school administration, elementary-school supervision, educational guidance, and the rest.) Confusion and more confusion! I wonder if we shall sometime devise lists of letters to identify persons prepared for certain subjects, levels, aims, and types of students. (Bachelor of science in industrial education, with major in printing, in junior high schools, under general aims, for both boys and girls.)

Simplifying Degree Terminology

Let's work back from confusion; let's say bachelor of science for all education degrees of first level. All of our graduates will then feel that they belong, that their efforts have not been green-tagged nor discounted. They will find it easier to transfer to other schools, either before or after graduation. School administrators who will need to know their major fields or detailed preparations, for employment purposes, will have no difficulty in securing transcripts of credit. I would like to see the same plan of one name used for degrees above the first, for all men and women in education. The suggestions are bachelor of science, master of science, and doctor of philosophy, although doctor of science is equally if not more logical. I would shy a little at bachelor of education, master of education, and doctor of education, as meaning in the academic world something below the best. We, in education, want and deserve highest rank in the degree environment.

There is an interesting question as to what institutions should offer degree work in industrial education. The answer must be, "all institutions whose officials desire to do so." At the first-degree level, the group might well be limited to those institutions whose programs the state is willing to support or to approve for the service in question. This would place under designation only the institutions inclined to make worthy attempts, only those above the level of sham in this particular activity, only those willing to study and to match the needs of a growing, changing field. Beyond the first degree, I would withdraw the suggestion of state support or approval. Any institution should be privileged to do graduate work in this field if it feels that it can provide the faculty, library, and other facilities which will assure good preparation. And, what *is* good preparation? I should say it is what *seems* good to those who know. And, who should *know?* Those who are studious, experienced, and professionally minded within the area of the training proposed.

I have never been certain of the need of inspectional, supervisory, or accrediting groups or associations. These stand-

ardizing agencies tend to coerce institutions to use programs and plans which they might not otherwise employ. While admitting that some general good has been done by such agencies, I believe that to tend toward uniformity is to preclude experiment and, therefore, to render progress uncertain or unduly slow. Education has one advantage over certain other professional fields in that the agencies checking our changes are representative of preparatory institutions rather than of the practitioners themselves. The difference is marked and important. But, after all, these agencies are only self-constituted groups. Others like them could be formed and could reasonably be expected to attain equal or greater influence. We return to two major questions. Do we need such agencies? Will not progress be best guaranteed by the unhampered advance of individual institutions, granting errors and failures in quantity?

If one institution creates rigid entrance requirements and very difficult demands in credits, examinations, and researches, let no one question the right. If another institution sets a less formidable pattern in any or all of these respects, the right is the same. Each higher institution should be privileged to establish its own plan and strength of work, using its own judgment as to how long to continue with any given procedure. General results or specific product will become the criteria of success. The causes of failure will probably be definite and more or less clearly evident.

Because characterizations are always interesting I have presumed to state, in very brief form, my best judgment as to the nature of appropriate programs at the three degree levels. We are thinking in terms of industrial education, including both the industrial-arts and trade-training phases of the movement. Here we meet the possibility of great difference of opinion, because our individual cases and our institutional plans vary widely. The following notes are in terms of patterns, without description as to per cents of credit of the several types.

The First Degree

Broad and fairly general course work in the first two years of the program. This will force orientation and will permit a student's transfer to another department or institution without great loss of credit.

A large total of academic work, especially in English, science, economics, sociology, political science, and art. This will build up a cultural base and will afford preparation for a probable combination schedule in the first teaching position.

Much shop and drawing work, in scatter rather than in concentration. For beginning service, and probably throughout their professional lives, most of our graduates will profit greatly from breadth rather than intensity in the manipulative subjects.

A considerable amount of educational content outside the major field. Our graduates must be brought to appreciate the purposes of different school units and must understand the accepted portions of psychology and pedagogy. They must be reasonably prepared to change, as the years pass, to other educational services.

Much industrial-education content of lecture and classroom kind, as contrasted with manipulative work. Some of our materials are specific and necessary to success in this special field of teaching. While general professional courses are fundamental, there is an increasing need for more professional courses of our very own.

Better selection of those admitted to preparation.

Qualifying examinations, of comprehensive type, at the close of the junior year.

Extended periods of observation and practice teaching.

Detailed personal records and, therefore, better matching at times of recommendation or placement.

The Second Degree

Emphasis on the job ahead rather than the one at hand. Advancement being the aim and hope of candidates for the master's degree, they must learn that promotion usually means change of work. Programs must be built to provide preparation for these changes. More of what they have had will not guarantee a reasonably better position or success at such new level.

Heavy credit requirement in subjects normally completed by superintendents, principals, supervisors, and teacher trainers; remainder of credits in advanced professional courses in industrial education.

Graduate status based upon entering examinations, rather than upon the standings of the institutions which granted the first degrees. Probation for some students upon this basis; extra credit for others, upon the same basis.

Programs built for individuals; no standard set of courses for all candidates.

Easy crossing of departmental or college lines for the building of major and minor patterns. While concentrations, such as minors, are worthy, a graduate student should be privileged to use a certain fraction of the required credits in the meeting of his own desires.

Possibility of five years of work leading to the second degree, with or without award of the first degree.

Possibility of some sort of supervised apprenticeship in industrial education as part of the credit load, for selected individuals.

No foreign-language requirement, but evidence that candidates are reasonably proficient in English.

No shop and drawing courses, in the common nature of such work. Probably advanced courses of scientific or experimental kind dealing with the materials, tools, machines, processes, and problems of individual trades or groups of related occupations.

Thesis, optional with the adviser, rather than with the candidate. Thesis required for, perhaps, one tenth of the candidates. Other candidates privileged to substitute strong margins of course credit. Thesis committee members, in the case of each candidate, to be representative of three fields including industrial education.

Final comprehensive examinations of objective type, after all other requirements have been met. No final oral session except at the pleasure of the adviser.

The Third Degree

Candidates well selected. Attention given to ability, age, financial status, work conditions, and type of future employment desired. There should be reasonable assurance of the professional advancement of the candidate and probability that he will reflect credit upon the institution and the profession.

Individual programs. The full program of a candidate should include all course work done at all institutions attended after award of the first degree. Attempt to fill gaps in fundamental preparation, such gaps to be located by study of transcripts or by broad examinations. Advanced work on basis of

fields of study useful in the light of the aims of the candidate and productive of real acquaintance with recognized professors. Varying amounts of credit in the programs of the several candidates.

Major work in the education courses often termed general. Depth in each advised direction such as administration, supervision, measurement, curricula, etc. While a master's candidate would pursue basic yet advanced courses in school administration, educational psychology, etc., a doctor's candidate would follow these with more specific subjects within the chosen areas, such as school finance, school buildings, techniques of supervision, mental deficiency, etc. There is a vast difference between acquaintance with and technical competence in the areas.

Minor work in industrial education. Major in the specialty is not recommended. There is assumed that the success of a graduate at this level depends less upon knowledge and proficiency in his own field than upon grasp of educational problems of wider scope. This recommendation has particular force when a candidate plans a college career or leadership in a large school system.

Progress by milestones, such as status, program, languages, preliminary examinations, thesis acceptance, final examinations.

Other angles of the degree problem deserve similar consideration. All of the points mentioned here are worthy of more extended treatment. Our time has been brief. I can only hope that what has been said here may have proved interesting and that others, quite as familiar with the subject, may have been encouraged to publish additional discussions. We need expressions of opinion, even conflicting opinion. The philosophy and practice of degree work in industrial education will continue to be matters of importance to all of us.

Maintenance Man of Real Property

Edward C. Galligan

New Bedford, Massachusetts

An outline for a course which deserves more attention the country over.

The following is a list of short jobs that is suggested for an outline for a course of study in general vocational classes that would tend to fit a young man for a job as a maintenance man of real property.

Most of the items are short and it would not be advisable to have, nor do they require, the services of a specialist. It is recommended that the maintenance man be advised not to tackle any job that requires the services of experts but that he turn such jobs over to others who are more capable or better equipped to do the job at hand.

At the present time, banks are holding considerable real property and have need for men who are versatile to handle the small odd-job problems that arise. Investors who had their money in mortgages are foreclosing, and they also can use capable men to look after the physical needs of their property. If a young man, of the right sort, is trained properly, there should be an excellent opportunity for him to go further in the field as a specialist or as a collector, renter, or perhaps a broker in the real-estate line.

In regard to the actual teaching of the items in this list, most of our vocational and continuation schools are well equipped with tools and competent instructors to carry this out with little addition to their present equipment.

The list could be rearranged, with additions or omissions, and allotted to the instructors who are best qualified to teach the particular items; for instance, the electrical jobs could be carried out by the electrical instructor, the door and window work by the woodworking teacher, the plumbing could be divided between the machine-shop man and the electrician, and the versatile academic man could find lesson material in the whole outline.

It is suggested that all additional tools and supplies be purchased as the jobs arise, and that no job be undertaken unless there is actual need for that particular work to be done. If work is done on the school plant, then charge the expense to the building upkeep account. The material, supplies, and tool charge are, of course, to be paid for by the party for whom the work is being done.

Care should be taken for the selection of boys who are interested in this work, and the number admitted should be limited.

Some of the work can be done in the school shops or around the school plant, or it may be necessary to do some of it in a co-operative way. As the work is satisfactorily completed, it should be checked on a record card, and that card, or a duplicate, should go out with the boy when the time for his placement has arrived.

Window Work. Replace window cords and weights; set glass; draw sash (paint putty outside); paint sash (inside); replace window latches; hang window shades; replace cloth on roller of window shade; tighten spring in window-shade roller (adjust tension); replace wire mesh on cellar windows; hang storm windows; paint screens; take off skylight, reputty, paint, and replace (from inside).

Doorwork. Hang screen door; hang storm door; adjust or replace door knobs; replace screws in door plate; change locks; adjust latch so that door will close properly; plane back edge of door that sticks; take door off hinges; put up and adjust door checks.

Walls and Floors. Patch holes in plaster walls; drive nails in plaster walls to strike studs; take off wallpaper; size walls for paint or paper; scrape ceiling; wash paint; fill cracks in floors; prepare old floors for varnishing or painting; varnish or paint floors; wax floors, put up plaster-board ceiling in attic.

Electrical Work. Replace wall switches; replace electric fixtures; replace fuses; adjust doorbell; change over a doorbell system from battery to transformer; adjust or replace doorbell button; change doorbell transformer from downstairs meter to upstairs meter; replace plugs on electric appliances; ground radio wires; replace sockets; oil electric motors (refrigerator, oil burners, etc.).

Plumbing. Water — locate and shut off water main; locate and tag all other shut-offs; repack shut-offs; replace washers on faucets; repack faucets; grind faucet seats; drain water system (to prevent freezing); drain taps, hot-water tank, hot-water heating system: thaw out water pipes. *Toilet* — Clean sink traps; clean out drains; fish lost articles from toilet bowls; adjust flow of water in toilet tank; replace rubber flush ball in toilet tank; replace metal float in toilet tank; replace washer on shut-off cock in tank; put in new spud washer (from flush box to toilet bowl);

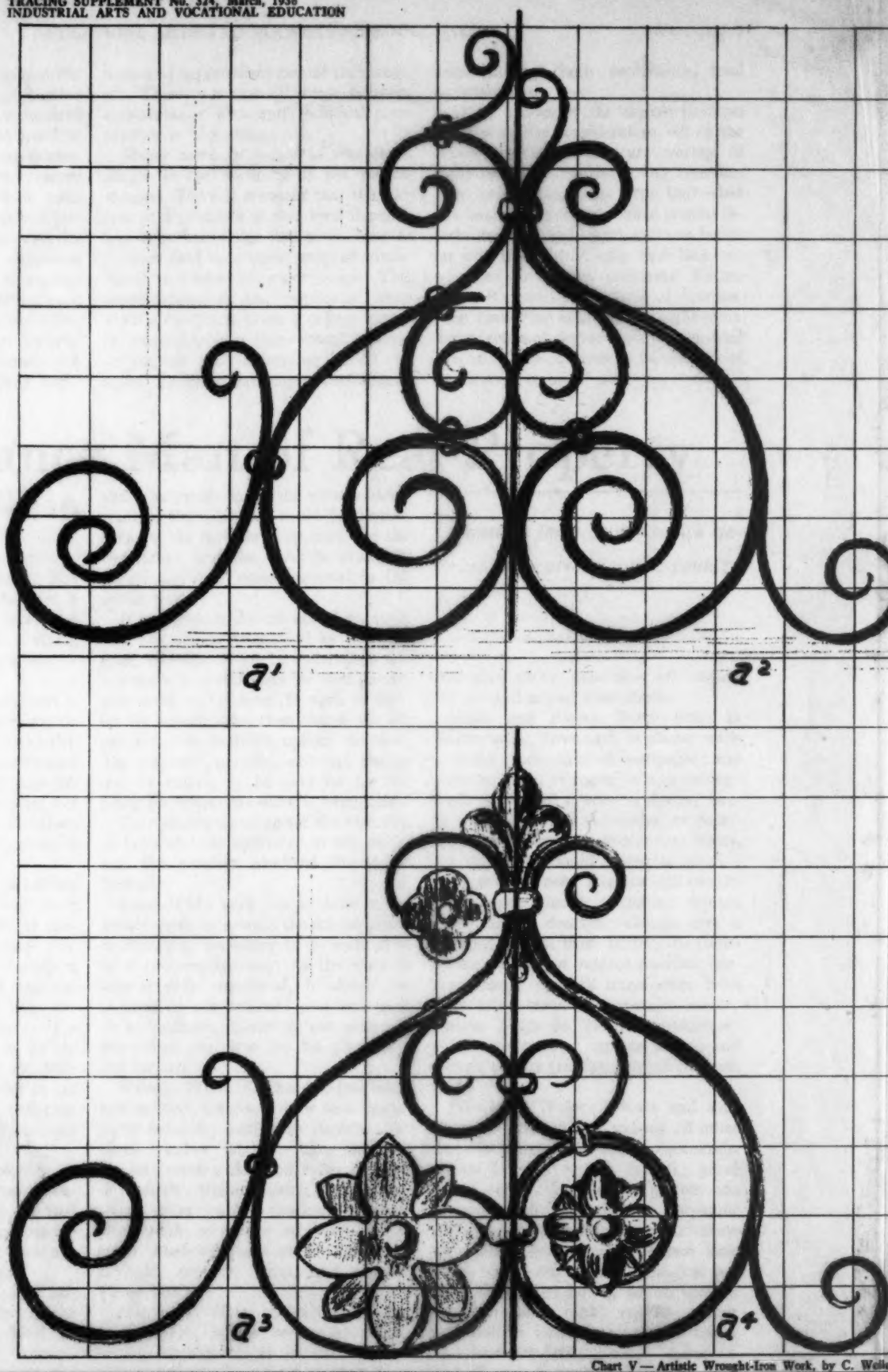


Chart V — Artistic Wrought-Iron Work, by C. Wells

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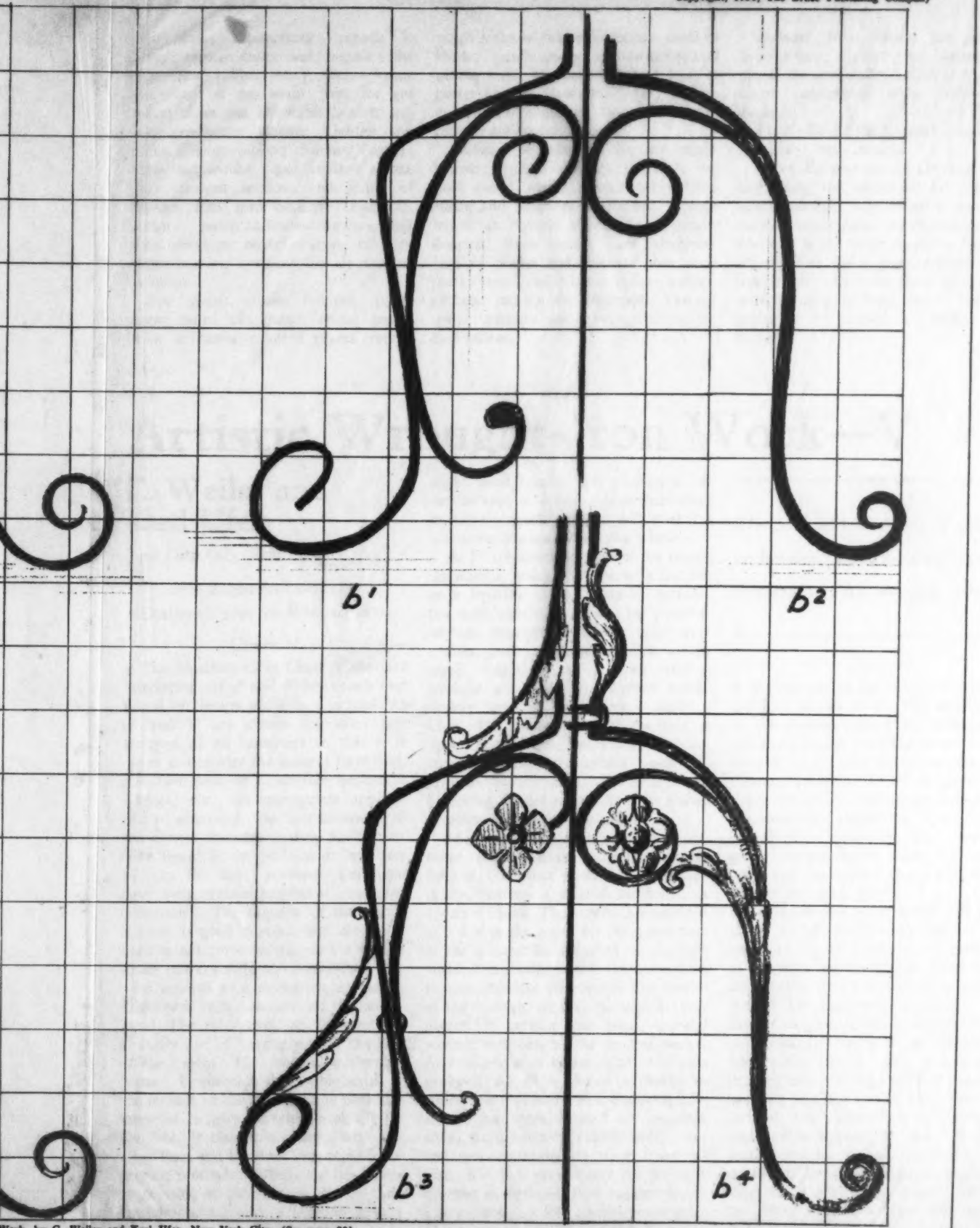


Work, by C. Weiler and Karl Ufer, New York City. (See page 89)

sink drain connections — repack in putty; change toilet seat; repair toilet seat (new rubber, etc.). *Gas* — locate and shut off gas main; test for gas leaks; clean gas hot-water heater; adjust gas-burner flames; tighten gas cocks. *Heater* — clean chimney (base); clean out smoke pipe; replace smoke pipe; cement sections and joints of furnace with iron cement; clean out furnace; patch asbestos furnace and pipe coverings; repack valves; fill hot-water heating system; let air out of radiators.

Low Roofs. Raise ladders; paint steps; paint flat piazza roofs; patch leaks in canvas-covered piazza roofs; patch leaks in rubberoid piazza roofs or sheds; patch leaks in tar-and-gravel piazza roofs or sheds; replace lead in gutter corners (low buildings); replace goosenecks in gutters (low buildings); replace conductor pipes.

Outside Woodwork. Replace clapboards; replace shingles (siding); repair board walks; brace up outside stairs and entrance platforms; replace treads on outside stairs; repair piazza flooring; flash header over windows; jack up piazza and brace or shim supports; renail rails; brace fence; replace pickets; put up new fencepost; line up fence; prepare and set up posts for clotheslines.

Cement. Mix cement for patching foundations; point up foundation; patch cement walks, cellar and garage floors; whitewash walls (cellar and garage).

Yard. Grade yard; plant grass seed; roll lawn; trim shrubs.

Other Requirements. Drive automobile; shop for materials and supplies; select material; buy material; keep cost records; hire special mechanics on jobs where it is advisable to do so (carpenter, plumber, etc.); inspect building for fire hazards (for lower insurance rates); order tenants to keep place clean and sanitary; be tactful in dealing with tenants.

Artistic Wrought-Iron Work—V

C. Weiler and Karl Ufer

New York City, New York

(See Supplement No. 324)

(Continued from the February issue)

The fifth of this series of articles on the design and techniques used in working with wrought iron.

Chart V

The illustrations in Chart V also are interesting. At a^3 and b^3 are shown feet found on lamps made in a school. At a^1 and b^1 are shown the same feet stripped of all ornament so that it is easier to consider the general form first, and then proceed to another important subject; viz., the appropriate application of ornament. The foot shown at a^1 has almost the same typical faults that were found in the grille at a^1 in Chart IV. In the foot, however, the ends have been treated somewhat more appropriately. The thought of the major S scroll is good in spirit, but the scroll itself is not correctly proportioned. The small inner scroll, which evidently has been applied as a strengthening factor, might well have been carried to the tie-band. The little scroll at the very top is badly out of harmony with the rest of the design. The most objectionable feature, however, is the double scroll at the outside of the leg which is basically essential to give sufficient stability to the foot. It clashes decidedly with the other lines and is rather impractical, because it protrudes entirely too far, thereby creating an obstruction. We see thus how practicability is a most important feature in design. In design a^2, exactly the same curves were utilized with but slight modification and placement. It can be seen at a glance how these comparatively small changes will work for a harmonious and attractive whole.

At b^1 are strikingly shown the results obtained in using the pipe with the slot as a bending device. This is, perhaps, the most unsuitable among the scrolling devices enumerated earlier. The most evident fault is the termination of the scroll, beginning as it does with a straight end. This is followed immediately by a sudden curve — really a kink. The general line of the foot is about as awkward as it may be constructed, this awkwardness being aggravated by the further use of a poorly balancing double scroll. At b^2 is shown a better solution of the problem.

The proper use of ornaments is another very important subject to be considered. The foot shown at a^3 appropriately utilizes a *fleur de lis* design as a center motif. The rosette alongside it is probably the cause for the upper part of the S scroll being pulled too far outward, this having evidently been done to accommodate the rosette. The rosette at the bottom, as may be seen at first glance, is entirely too large, thereby adding heaviness to the general design. At a^4 is shown a better solution of this problem. At b^3 is shown a design in which a leaf growing in a downward direction has been applied at the main stem. As previously stated, both form and ornamentation are taken from nature, and but very rarely do we take liberties in deviating from nature's ways. Consequently, a leaf should never grow downward, but in an upward direction. The other leaf shown on the same foot is as improper as the outer scroll was in the foot shown at a^3. The application of the rosette cannot be criticized in principle, except that the flower is suspended in a rather unnatural and unpleasing position. At b^4 is shown the improved design, the upper leaf growing upward, suggesting the further growth of the main stem. The lower leaf grows harmoniously with the major lines, and the rosette is suspended and framed in logical place.

Before we leave the subject of ornament, we should like to make a few pertinent remarks relative to their use in schools. We know well from many discussions, that this subject is controversial. The making of ornaments, leaf hammering, as we call it, is perhaps the most difficult operation in ornamental iron work, and it takes considerable training and practice before the student becomes proficient in it. We, therefore, counsel that either good purchased ornament be applied, or that it be eliminated entirely. Where facilities or capability of leaf hammering are not available, design should be created without the aid of ornament. That this can be done successfully is clearly evident from Chart IV.

INDUSTRIAL ARTS *and* VOCATIONAL EDUCATION

J. J. Metz, Editor

And Still There Are Doubters

It is but a few short weeks ago when the world was startled by the astounding accomplishment of that giant airplane which American enterprise, genius, and daring has perfected, the "China Clipper." The flight from San Francisco to Macao in far-away China was not the outcome of a thought quickly conceived and hurriedly carried out.

The work started with the careful plotting in 1931, of an air lane 9,000 miles long, uniting America with Asia. There were no airplanes at that time in which one could venture such extended flights over water so that the pioneer conquerors of the air — Trippe, Priester, and Lindbergh — were confronted with the task of designing and building the type of airplane which could withstand the strains and buffetings which such a voyage would entail. Furthermore, bases had to be established at various points so that the planes could be serviced en route. And then, most important of all, men had to be trained to handle these giants of the air — resourceful men who would not only dare to attempt but who also could make quick decisions in an emergency.

Naturally, such widespread and all-encompassing preparations took a great deal of time, and yet these men did all of it in the short span of about five years. Their accomplishment with its planning and steady striving for a goal, and the final overcoming of all obstacles is a fit subject for an epic poem. Their achievement may well be used to picture the spirit of our time.

It is true, the men who conceived and carried through this great undertaking are geniuses, but they did not "just happen." They, as well as the men who are carrying on the enterprise, needed an education which would fit them for the responsibilities which they had undertaken. Their task requires more than just natural ability and, without detracting from their achievement, it seems evident that they would have failed had science, technical knowledge, and industrial inventions not made such tremendous forward strides during the past century.

Confronted by stories of the almost unbelievable happening about us day after day, it is difficult to understand that there are still so many men — yes, even educators — who cannot sense that the educational offerings of today must necessarily be quite different from those of one hundred, nay, even of fifty or twenty years ago. Few men today are born into a life that can be spent in contemplation alone. They have to live in and adapt themselves to a life which uses the forces of nature in a way much more comprehensive than ever before. The puny strength of man is multiplied many times by the machine, and it is essential that he learn how to use and dominate the mechanical servants which have been devised for him.

A purely academic education for all is no longer feasible and the accomplishment of the men who have made the "China Clipper" a possibility is the best argument for the enlargement and perpetuation of that phase of educational work known as industrial arts and vocational education.

Awarding School Contracts to the Lowest Bidder

It has become an accepted rule in this country that the award of a public contract invited upon a competitive basis must go to the lowest responsible bidder. Such bidder, in compliance with the specifications, usually accompanies his bid with a certified check as a guarantee, that he will provide a bond for the faithful performance of the contract.

So far, everything would seem to be in proper order. The assumption must be that all contractors have bid on the same thing and that the bond provides the necessary assurance that the service bargained for will be rendered.

Experience, however, in recent years has taught that failures to fulfill contracts arise and that a bond is not always a sufficient guarantee against losses and annoyances. In the past, the term "responsible bidder" has not always been clear or conclusive. The irresponsible bidder may hide behind a bond. He may be a fly-by-night operator, who is not equipped to carry out a contract and will trust to luck and the whims of fortune to see him through.

If he fails to fulfill his bargain, the purchaser may fall back upon the security afforded by the bond. And what does this mean? The bonding company may be liable for the amount of the bid, but if the contract is awarded to the next lowest bidder, that is not assurance that any added costs will be covered by the bond. In other words, the higher figure which must be paid in case of re-letting is not covered by the indemnity offered. Besides, the collapse of a contractor is always attended with vexatious delays and embarrassments.

Thus, public authorities have fortified themselves by placing a new interpretation upon the term "lowest responsible bidder," by exacting a definite statement that the prospective contractor is in reality equipped to perform the service expected of him.

In a midwestern city, six bids were submitted recently for a construction job. Odd as it may seem, the three lowest bidders were alike in their figures. It appeared for a time, that they were in collusion. This was, however, not the case. In complying with the then existing labor code, they had arrived at a similar figure. The award went to the contractor who had rigidly complied with specifications. These provided that the contractor must demonstrate that he is fully equipped with a plant and machinery and a trained organization to carry out the bargain. In this instance, the board was unwilling to risk the services of an interloper with only a surety bond to back him, and insisted upon purchasing the services of a reputable bidder who had a production plant, a competent staff of men, and a record of experience and of honorable dealing.

In the field of school shop equipment and supplies another factor enters. It is frequently considered necessary to purchase a new product which is somewhat in the experimental stage and which can only demonstrate its value after a period of use. In such a situation a guarantee is the only dependable safeguard. Again, the responsibility, the financial solidity, and the length of the contractor's or manufacturer's record are the final safeguard of the purchaser. If the contractor, or manufacturer, is irresponsible, the school board will eventually bear the loss. For this reason, the school board may well insist upon doing business only with the truly responsible bidder who is able to make good on his bargain even after he has received his money and has departed from the scene. To be accepted as a responsible bidder implies an honorable performance of a contract in all its essential detail.

Problems and Projects

MODERNISTIC SMOKING STAND

Lawrence E. Wolske, Menomonie, Wisconsin

The smoking stand described herewith is of such simple construction that it can be built in any home-mechanics or general metal shop.

The Base. Cut a disk of 20-gauge sheet steel 8 in. in diameter. On the rougher surface of this disk remove the oxide 1 in. from the edge all the way around so as to have a surface to which solder will adhere. On this same surface, lay out the flutes as shown in the illustration and punch out the flutes with a 1¼-in. sheet-metal punch.

To make the side of the base, cut a 1⅛ by 28½ in. strip of 24 gauge sheet steel. Remove the oxide about 3/8 in. all along both sides of one edge. This can be done with a mill file. Divide the strip into 24 equal spaces. Each space will be 1 3/16 in. Square lines across the divisions with an awl. These lines indicate the points of the flutes. Form the points of the flutes by bending the strip at each division in a vise at a sharp angle which corresponds to the intersection of the flutes in the drawing. Form the curve of the flutes by bending each section on a pipe 1¼ in. in diameter. Solder the side of the base to the underside of the top. File or grind off any part of the top that projects over the side.

The Base Disks. Cut two disks 4½ in. and 3 in. diameter of 16-gauge sheet steel. Remove any irregularities on the face surfaces and smooth the edge with a mill file.

The Scroll. On a large sheet of paper, lay out the scroll to full size as shown in the illustration. Select a strip of steel 3/16 by ¾ by 36 in. Taper the strip so that it is ⅝ in. wide at the upper tip and ¾ in. at the bottom tip. Polish with a mill file and emery paper. Form the scroll with the aid of bending forks so that its curvature complies with the layout.

The Dish Holder. Select a brightly colored glass ash dish. On the bottom of the dish place a tape measure and measure the distance from one edge to the opposite edge. Make the strip that is to be riveted to the scroll of a piece of steel ⅛ in. or 3/32 in. by ½ in. by the dish measurement, plus 3 in.

Make the crosspiece of the same material. Its length should be ½ in. more than the measurement from edge to edge underneath the dish. Round the tips of both strips, file and polish. Locate the rivet holes and drill with a ⅛-in. drill. Countersink the crosspiece. Form the two pieces, as shown in the illustration, and countersink and rivet the two pieces together.

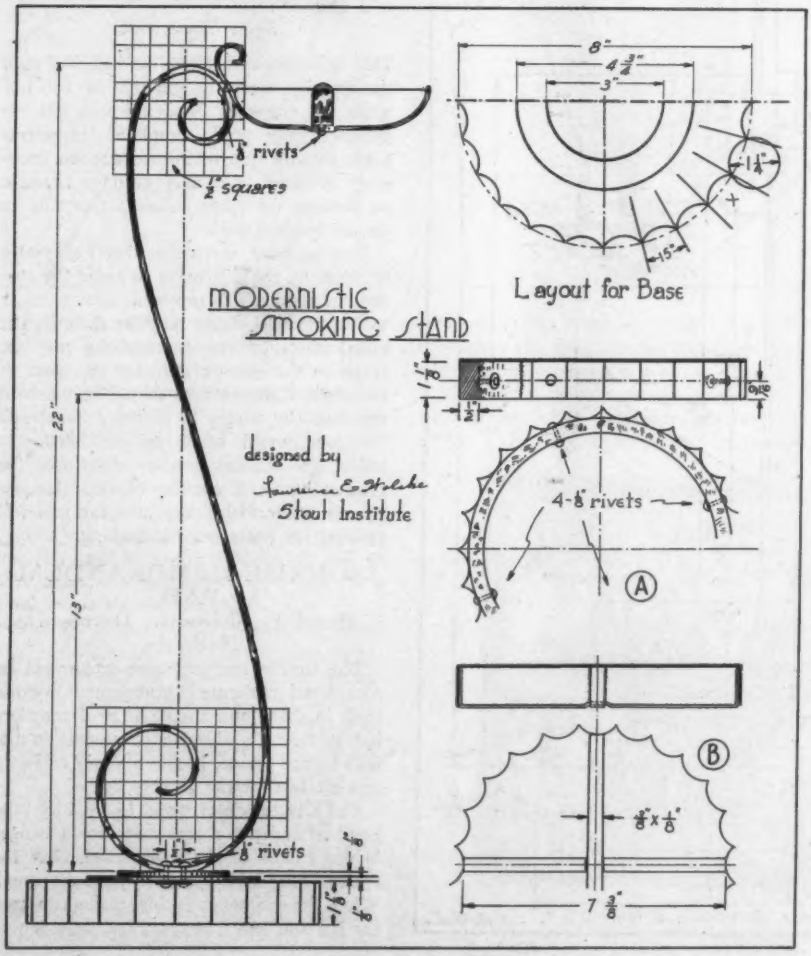
Assembly. Rivet the scroll to the base as shown. Use two ⅛-in. rivets with washers under the base.

Rivet the ash-dish support to the upper scroll. Use a ⅛-in. rivet. Polish the heads of the rivets with emery cloth.

Weight the Base. Weight the base by riveting a ½ by 1⅛ by 23⅛-in. lead strip around the inside of the base, as shown at A. The lead strip should first be formed into the proper thickness, width, and length, and then bent into a ring with the forming rolls. Place the ring in the base, and drill four ⅛-in. holes through the base and the ring. Rivet the ring to the base with ⅛-in. rivets. Use washers on the inside ends of the rivets.

Optional Crosspieces. Although weighting the base is the best method of making the stand more stable, a less satisfactory yet easier method is to insert two ⅛ by ⅜ by 9⅝-in. steel strips as shown at B. These strips can be soldered to the inside of the base. They will keep the base from resting on its sharp edge.

Finish. Clean the surfaces. Finish the base with black lacquer, the two base disks with aluminum gilt, and the scroll and dish support with clear lacquer. Apply as many coats as necessary, rubbing down between coats with steel wool.



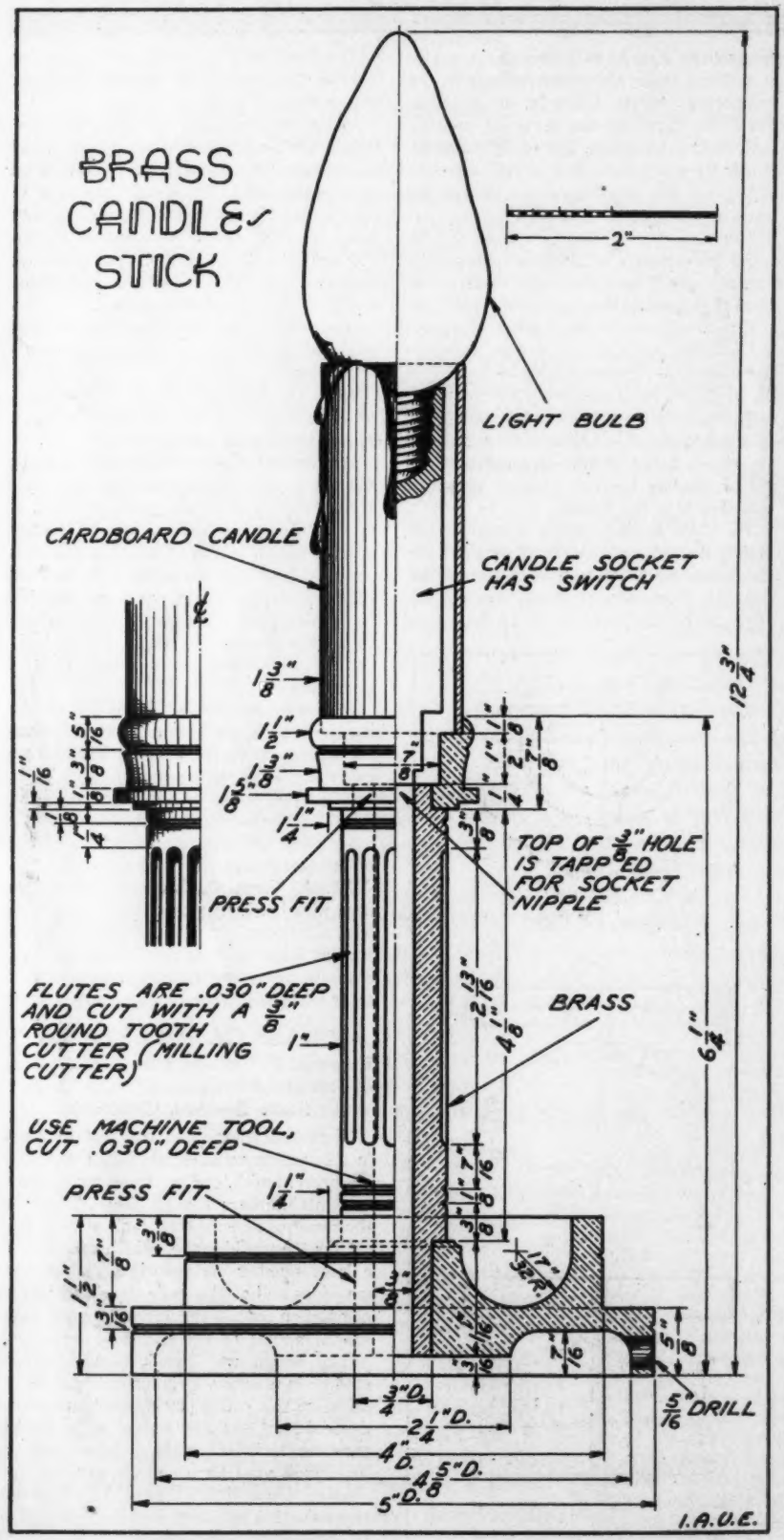
BRASS CANDLESTICKS

Emanuel E. Ericson, Director, Division of Industrial Education, State College, Santa Barbara, California

The candlesticks illustrated and described in this article were designed and made by Harry W. Smith, one of the senior students at Santa Barbara State College. They are the result of an endeavor to develop a project for the machine shop which will involve a large number of operations on different machines and at the same time lead to the completion of an article that will have special appeal to the high-school student.

The design was based upon principles studied in a course in industrial-arts design taken at this college by all prospective industrial-arts teachers and also by others pursuing technical majors. Brass from a local junk yard furnished the material for construction at little expense. An occasional trip to such a source of supplies is valuable to all students and teachers.

The electric wire and fittings needed, including the imitation candles and bulbs, may be purchased at any electrical supply store. They can usually be purchased secondhand if the prospective buyer has time and patience in conducting his search.



For the more advanced students, the drawing with its notation will be sufficient for the complete construction of these articles. It is suggested, however, that such students be required to make out a list of steps of procedure for the instructor's checking before the work is commenced.

Brass Candlestick

This will insure that the student has read the drawing correctly and that he will not waste his materials. Students with less experience may need complete demonstrations, step by step, of the various tool processes involved, and may need to practice on cheaper materials before attempting to do the finished work.

Two or more instruction sheets may also be made by the instructor to assist the student in making this project.

The electric wiring may be done in the metal shop or the candlesticks may be taken to the electric shop for this part of the work. Extreme care should be taken to see that the wiring is properly done, and the job should be inspected thoroughly before the student is allowed to take the articles home. A coating of clear lacquer put on either with brush or spray gun will prevent the brass from tarnishing.

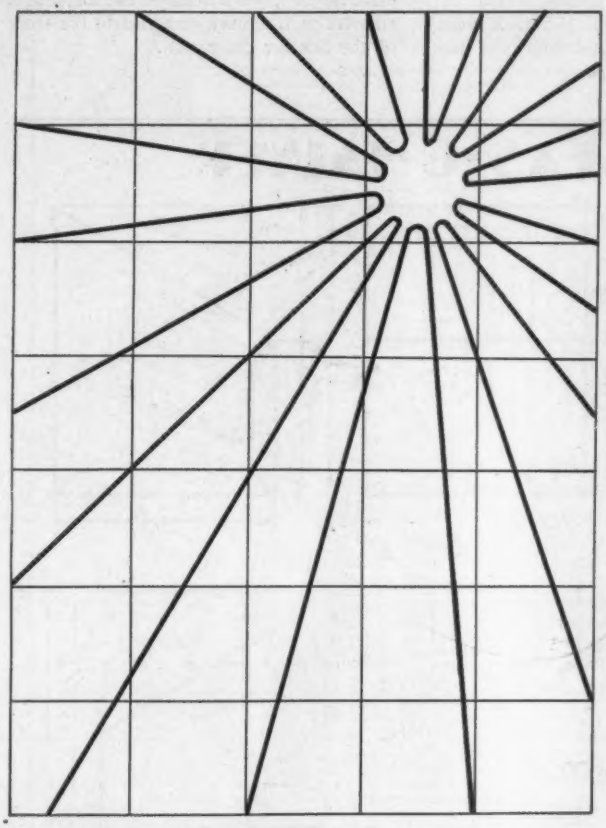
SUNRISE MEMORANDUM PAD

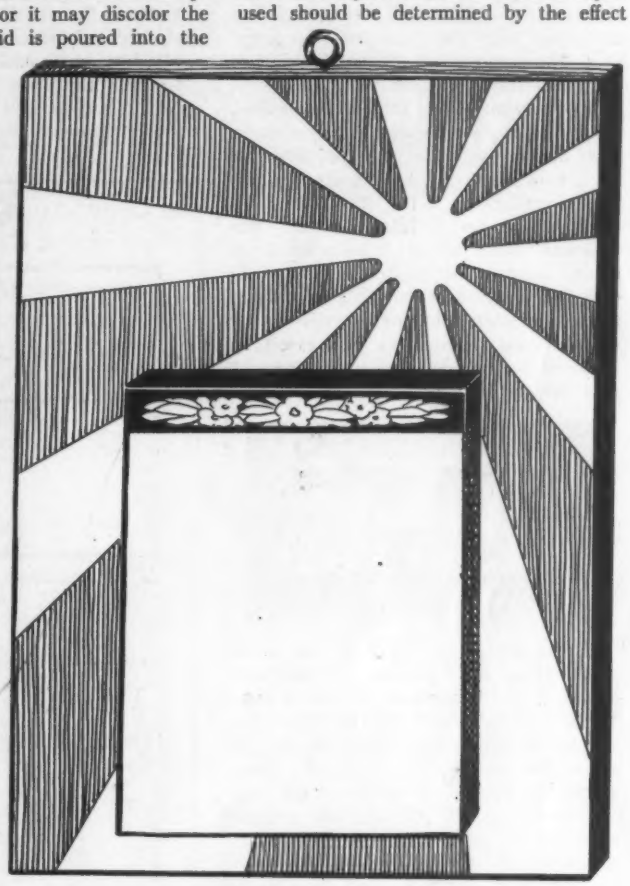
Hazel F. Showalter, Davenport, Nebraska

The sunrise memorandum pad might be considered modernistic in design. It is quite plain in shape and simple as to decoration, but it forms a pleasing ornament on the wall by the phone, beside a study table, or in a kitchen for the grocery list.

Cut a rectangle of wood ¼ by 5 by 7 in. Sand it, and put a screw eye for a hanger in the middle of the upper edge. Give the entire board two coats of yellow enamel. While the enamel is drying, make a pattern for the sun and its rays. First draw a rec-

tangle the size of the board and mark it into inch squares. Make a circle somewhat less than an inch in diameter in the second square from the top and from the right; then draw the rays to the circle as shown. Transfer these rays to the enameled wood with carbon paper, using a ruler, and then enamel the spaces between the rays a rather light brown.





A small, pointed brush is needed for making the edges of the rays. The best way to make a straight line with a brush is to hold a metal ruler resting on one edge at an angle so that the tin part of the brush can slide along the metal edge of the ruler as it is drawn along the line. The ruler should be held between the worker's body and the line. It takes a bit of practice to enable one to draw lines in this manner, but the time to acquire the knack will be well spent, for there is often a use for a good line made with a brush.

The memorandum pad should be about 3 in. wide by 4 in. high, but its exact size is not important. It is, however, important that the pad be glued exactly as far from one side of the board as from the other so that the board will hang straight on the wall.

USING LIQUID MOTH EXTERMINATOR IN UPHOLSTERED FURNITURE

Herbert Bast, Sheboygan, Wisconsin

A problem which confronts the teachers of upholstering as well as other users of liquid moth exterminators in overstuffed furniture is just how to use the liquid. It may be sprayed on, but if it is, it is not effective, as it will not usually reach the desired place. Then, too, if the application of the liquid is made too heavy, it may affect the nap of the mohair or other upholstering material or it may discolor the fabric. If the liquid is poured into the crevices of the furniture, it is apt to drip through to the floor, making it an expensive and wasteful method.

To get the liquid into the proper place without waste, sew together two or three 4 by 20-in. strips of cloth, preferably flannel. Saturate these with the liquid chemical. Remove the cushions and tuck the strips between the seat and back and between the seat and arms of the furniture. The saturated strips may be left in place for a week or two and if necessary saturated and replaced. The amount of liquid used should be determined by the effect wanted and by the strength of the odor of the moth exterminator.

This method is especially recommendable if furniture has to be left in the school shop over week-ends or stored for any length of time.

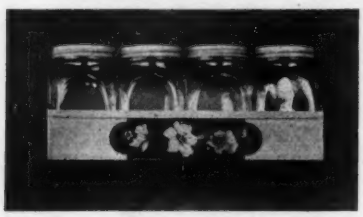
Tucking the cloth strip saturated with the liquid moth exterminator in place

SEAS-O-TAINER

Dale E. Mansperger, High School, North Olmstead, Ohio

The Seas-O-Tainer described and illustrated herewith is a useful addition to the equipment of the kitchen. As shown in Figure 1, it consists of a sheet-metal box containing four clear-glass jars with screw caps. The jars are to be filled with the desired assortment of seasoning.

The sheet-metal box used in this project presents some of the simple processes in sheet-metal work. It may be used either as an individual or as a class project in the metal-working unit of the laboratory of industries. The Seas-O-Tainer not only has practical value, but it is economical to make, since small glass jars, otherwise thrown away, may be used. Figure 1 shows a Seas-O-Tainer making use of four empty salad-dressing jars. Glass jars especially prepared for seasoning may be purchased in a five-and-ten-cent store.



If the seasoning containers are to be made from salad-dressing or sandwich-spread jars, it is necessary to bore a number of small holes in the lids. The jars should, of course, be uniform in size and shape. To meet individual taste, the size of the box may be adjusted to suit a varying number or size of jars. The jars are used like salt shakers. The glass jars must, of course, be collected before the pattern for the metal box is laid out so that the measurements may be adapted to the size of the jars.

Procedure

1. Follow the dimensions given on the sheet-metal layout in Figure 3, if they fit the glass jars on hand. If they do not, change them accordingly. Then lay out the pattern on a piece of No. 26 gauge galvanized sheet iron or tin in a position so that there will be the least possible waste. All lines should be marked with either a scratch awl or a scriber.

2. The lines on the layout which are made up of long dashes indicate that the metal is to be bent (not cut) at these particular places. Follow the outline closely and cut out the pattern.

3. Bend the ¼-in. fold at the top of the *back* and the one at the top of the *front* through an angle of 90 deg., and press it flat against the surface. See Figure 2 for the direction of the bend. Bend the ¼-in. fold at the top of each *end* in a similar manner so that it will be on the inside of the completed rack. In making all right-angle bends on the sheet metal, the metal should be placed on a piece of angle iron and clamped so that the bending line falls directly over the sharp corner.

4. Bend the ¼-in. laps at each end of the *front* and *bottom* to an angle of 90 deg., so that they may be soldered after the container has been shaped.

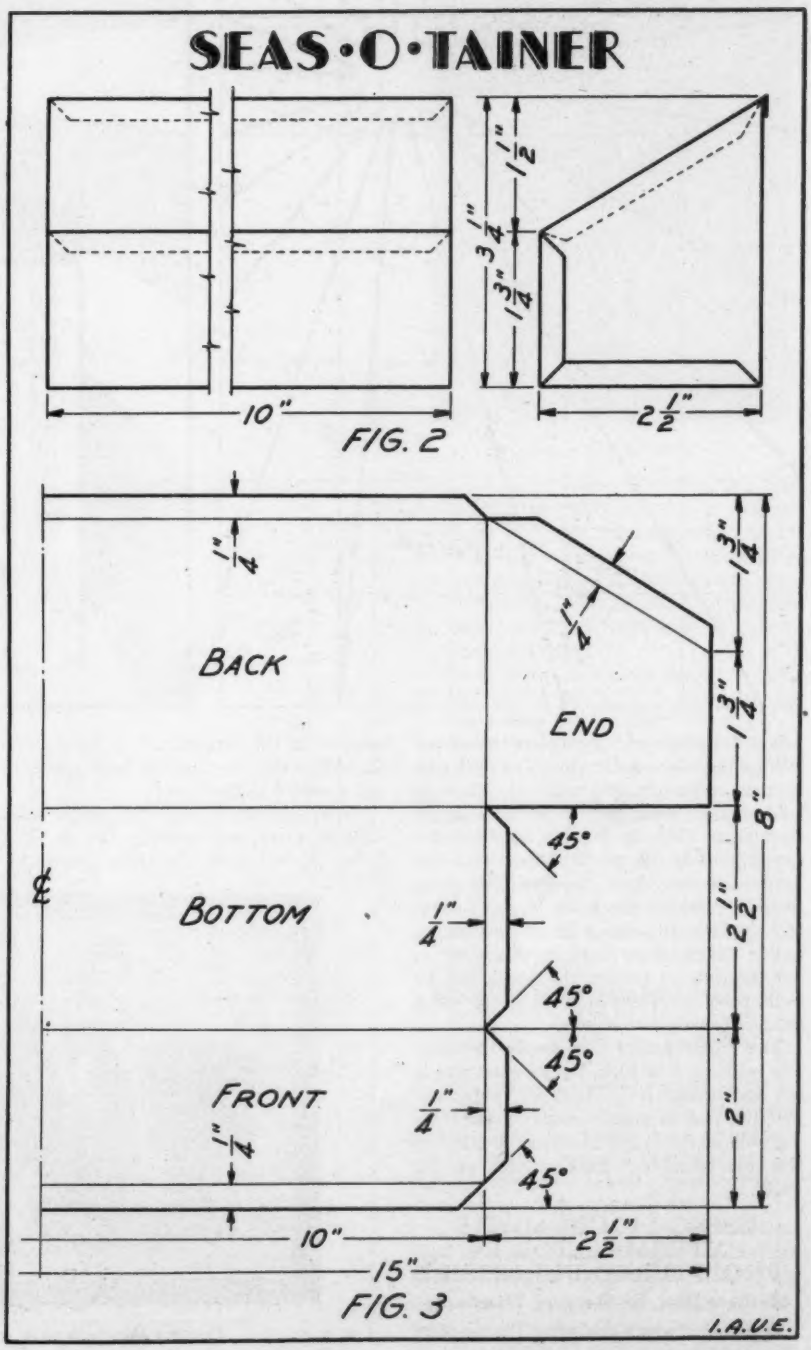
5. Place the container over a piece of angle iron or a stake of the proper design and bend it to its final shape.

6. Press the ends of the rack firmly against the ¼-in. laps and solder the joint.

7. Bore a number of holes in each jar cap to make a sifter cap suitable for the seasoning which the jar is to contain. Smooth off the rough edges of the holes.

8. Bore two 3/16-in. holes along the top edge of the *back* so that the container may be fastened to the wall if desired.

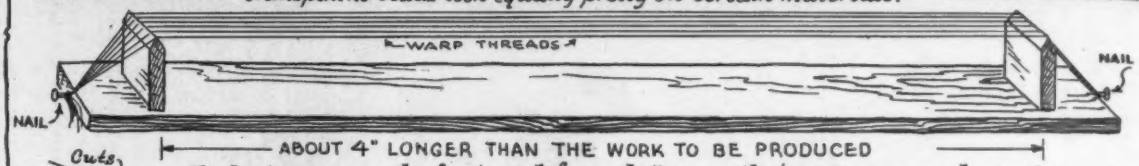
9. Enamel the box and the jar caps with two coats of enamel, the color of which matches the color scheme of the kitchen. A transfer picture may be added to the front of the box for decoration.

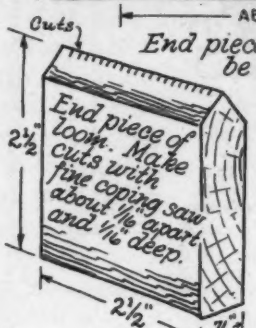


INDIAN BEADWORK

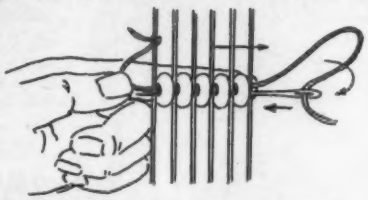
DESIGNED AND DRAWN BY W. BEN. HUNT ··· HALES CORNERS, WIS.

While the Indians used any and every kind of beads obtainable, the prettiest work was made with opaque glass beads. However, transpatent beads look equally pretty on certain materials.

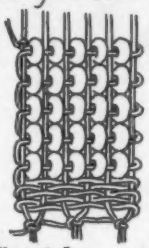




End pieces may be fastened from below with two screws each so they may be changed when shorter work is done. This simple loom is used for belts, headdress bands or any other narrow beaded strips.

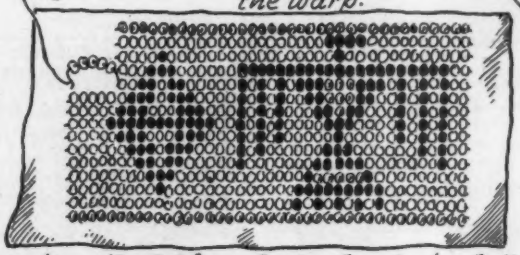


① *String required number of beads on thread, hold them in place on underside of warp and bring thread over end warp thredd and back thru above the warp.*

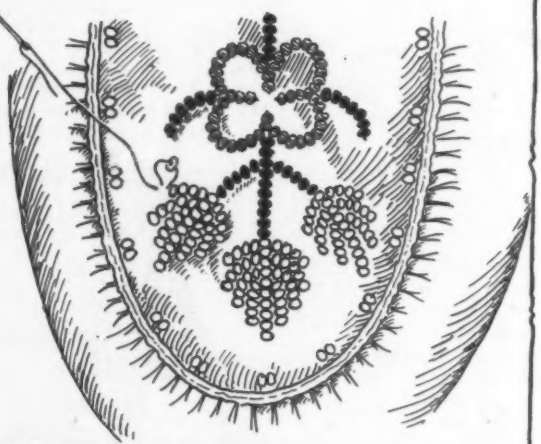


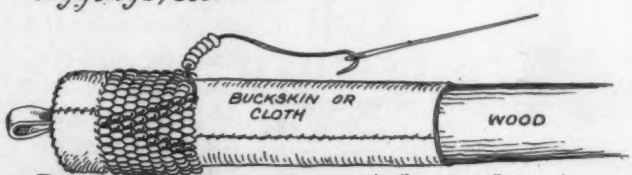
② *Finish by weaving back and forth and then knotting ends.*

Always use uneven number of beads across. Use waxed buttonhole twist for warp and also for threading beads. Special beading needles should be used for glass beads. For wooden beads use an ordinary thin sewing needle.



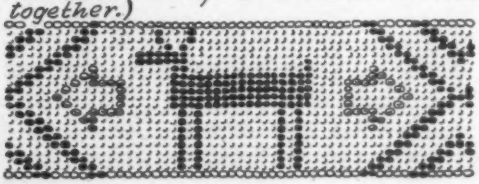
A method of applying beads to cloth or buckskin. Usually five beads are threaded and sewed in place at each operation. Care should be taken to keep the rows even. This type of work is used on buckskin vests, shirts, leggings, etc.

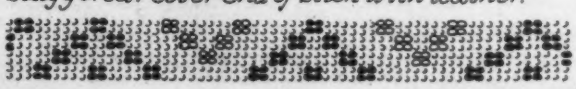




Beaded handles on drum sticks, rattles, etc. are made by first covering the stick with soft leather or cloth and then sewing the beads on with waxed thread in groups of 4 or 5, running spirally. Notice that beads are staggered. Cover end of stick with leather.

Beads on moccasins are sewed on singly because of the hard wear they recieve. Frequently only a leaf or flower design like the above is used without a background. (Beads are sewed on before moccasins are sewed together.)





HOW TO MAKE RAWHIDE

PLATE BY W. BEN HUNT, HALES CORNERS, WIS.

1 Get a fresh green calf skin from your local butcher or slaughter house.

2 Trim off surplus flesh and fat with a sharp knife being careful not to cut into the skin.

3 Lay the skin, hair side up on a clean surface and sprinkle about an inch of clean, dry wood ash over the entire hair side.

4 Work it well into the hair.

5 Wet the ashes by sprinkling with rain water or water from a creek or lake, working the paste thus formed into the hair.

6 Fold hide with hair side in and roll into tight bundle. Tie with rope.

7 Place it in a hole in moist earth and cover with earth to keep outer portions from becoming dry OR wrap it in wet burlap and place it where it can be kept moist.

8 Either way - it should lie for two or three days or until hair become loose.

9 Unroll the hide and rinse it thoroughly in soft water.

10 Scrape off the flesh side with scraper on beam as shown above.

11 Turn hide and scrape off the hair and the scarf skin at the same time, being careful not to cut into the hide. The motion is just the opposite from using a drawknife and calls for a little "elbow grease."

SCRAPER MADE FROM TABLE-KNIFE BLADE
DRIVEN INTO A PIECE OF WOOD. DRIVE NAILS THRU WOOD WHERE SHOWN AND CLINCH ON OTHER SIDE TO PREVENT WOOD FROM SPLITTING.
A BEAM IS SIMPLY A SMOOTH PEELED LOG OR HALF A LOG SET IN THE GROUND AT ABOUT THE ANGLE SHOWN HERE. THE UPPER END SHOULD BE ABOUT WAIST HIGH. BEAM SHOULD BE ABOUT 7" OR 8" WIDE. IF NO LOG IS AVAILABLE, ROUND OFF A PIECE OF 2"X8" PLANK. THE WORKER PRESSES AGAINST HIDE TO KEEP IT FROM SLIPPING AND SHOULD WEAR WATERPROOF APRON.

A DRYING FRAME MAY BE MADE OF SAPLINGS OR ANY OTHER WOOD STRONG ENOUGH TO WITHSTAND A GOOD PULL. ANY ¼" ROPE WILL DO FOR STRETCHING.

12 Rinse hide again in clear soft water and wring out as much water as possible by twisting.

13 Stretch hide as tight as possible and keep taking up the slack until hide is as tight as a drum.

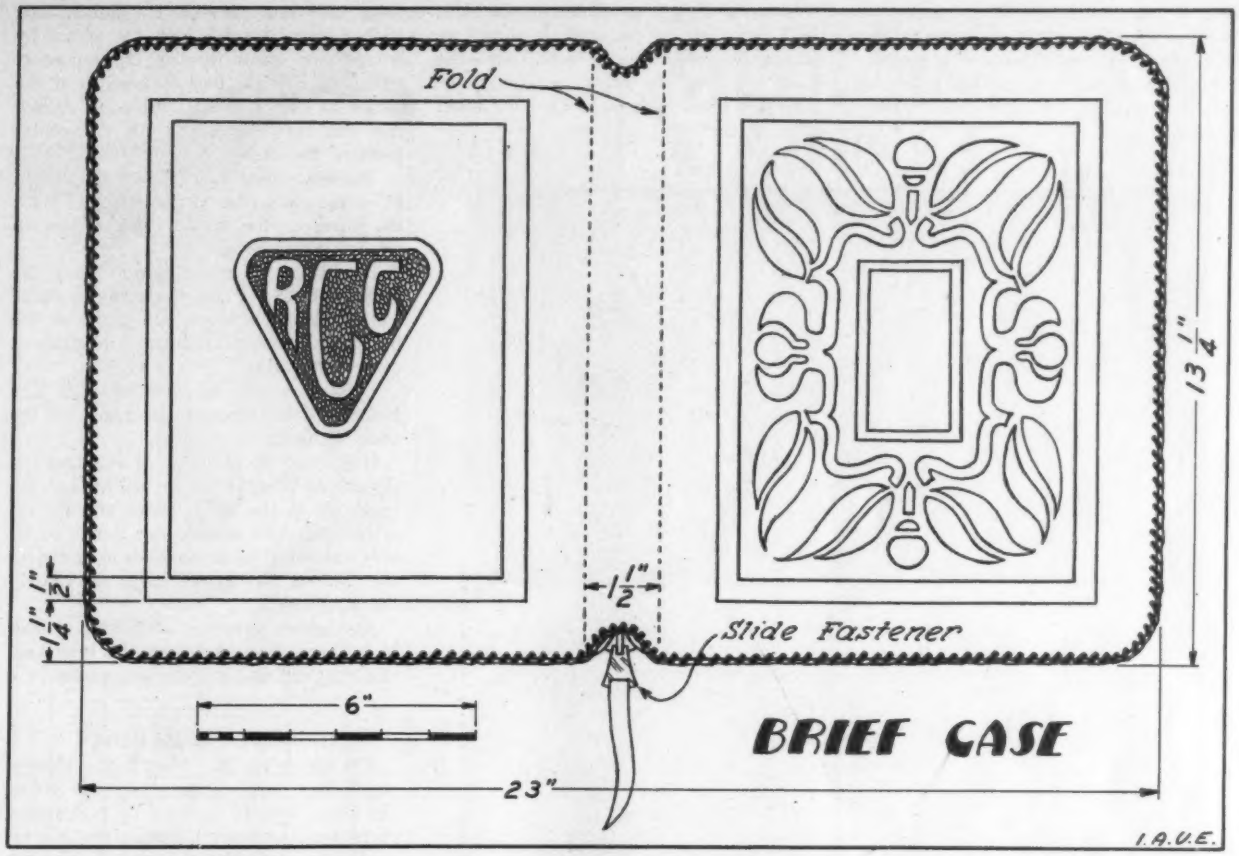
14 Set the stretcher and skin in a shady place where the air can circulate around it and allow it to become bone dry. You now have rawhide, but -

15 To really finish the job right, lay the hide on a smooth surface and go over both sides with a sandpaper block or a flat piece of pumice or sand stone. This smooths down any rough spots and also gives the rawhide a nice even texture.

16 Keep rawhide in a dry place. When ready to use, cut off as much as is needed and trim to size. Then soak it from 10 to 20 hours or until it is soft and pliable. Work it while it is wet, stretching it as much as possible, and when it dries it will be as tight and hard as a piece of sheet iron.

Plate on making tom-toms shows how rawhide lacings are cut.

Shellac or spar varnish will keep moisture out of finished work.



ZIPPER BRIEF CASE

Ross C. Cramlet, Amos Hiatt Junior High School, Des Moines, Iowa

The zipper-type brief case has become quite popular among professional people in the past two years. The probable reasons for this are that they are easy to carry, very attractive if well made, and they offer a safe way to carry valuable papers.

The cost of materials necessary to make the brief case described herewith varies somewhat, according to the quality used. However, if better materials are used, the period of service will be longer and the craftsmanship will show much more effectively. Materials needed are listed as follows:

List of Materials

1 pc.	13½ x 23½	Steerhide or calfskin	Back
2 pc.	6 x 13½	Steerhide or calfskin	Pockets
1 pc.	13½ x 24½	Suede	Lining
2 pc.	¾ x 38	Calfskin	Gusset
1 pc.	38 in.	Best quality	Zipper
1	1½ x 11½	Loose leaf, 1¼-in. ring	Ring stand
12 yds.		Best quality goatskin, ⅜-in.	Lace

After the material has been procured, a pattern should be developed on heavy, brown paper, showing all lines and details.

FOR YOUR BULLETIN BOARD

POSTER 69 **MARCH, 1936**

KNOWING THE OBJECTIVE

Growth and progress demand a clear understanding of the objectives underlying a given piece of work. Without knowledge of the purpose, a worker cannot give purposeful direction. Without an urge from within to achieve the objective, he won't accomplish or enjoy the work.

© Industrial Arts and Vocational Education

Submitted by Professor L. M. Roehl, Cornell University, Ithaca, New York

Then prepare the leather and transfer the pattern to it. The suggested design is very effective, and if particular care is given in reinforcing the embossed parts of the design on the back, the shadow effects are very pleasing.

After the designs are tooled on the back, the lining must be prepared. It should be cut slightly larger than the back. Locate the exact center of the lining, measure 1 in. from this point each way, place the lower edges of the two pockets even with these lines, and sew through the lining. One pocket may be subdivided for letters by sewing two seams through the center at right angles to the long dimensions of the pocket as shown in the illustration. Attach the ring stand *straight* with the center point of the lining.

The next thing is to insert the lining. Skive the outer edge of the back and place the lining on the inside, being careful to rub out all wrinkles.

To attach the gusset upon which the zipper is fastened, take the narrow strip of leather, skive the edges, and glue over the lining. Be careful to remove all wrinkles at corners and edges.

The case is then ready to be laced. The lacing will be through the edges of the back, lining, and the gusset.

If difficulty should occur in attaching the zipper, the probable cause will be that the two ends of the gusset strips are not exactly even. The remedy for this is to be very careful to make the ends even and to see that the two gusset strips are exactly the same length.

Any person interested in making articles of leather will enjoy making this brief case and they will find it to be very useful.

BEG YOUR PARDON

The article on the "Modernistic Flowerpot Holder," which appeared on page 379 of the December, 1935, issue of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION was erroneously credited to James E. Reagan alone, when it should have borne both Mr. Reagan's name and that of Mr. Earl E. Smith.

A CORRECTION

In the "bill of material" accompanying the article on the "14-Ft. Kayak" on page 30 of the January, 1936, issue of this magazine the following should be added: "11 pieces, ¾″ x ¾″ x 16′ S4S straight-grained spruce."

FOR YOUR BULLETIN BOARD

POSTER 70 **MARCH, 1936**

ACCURACY

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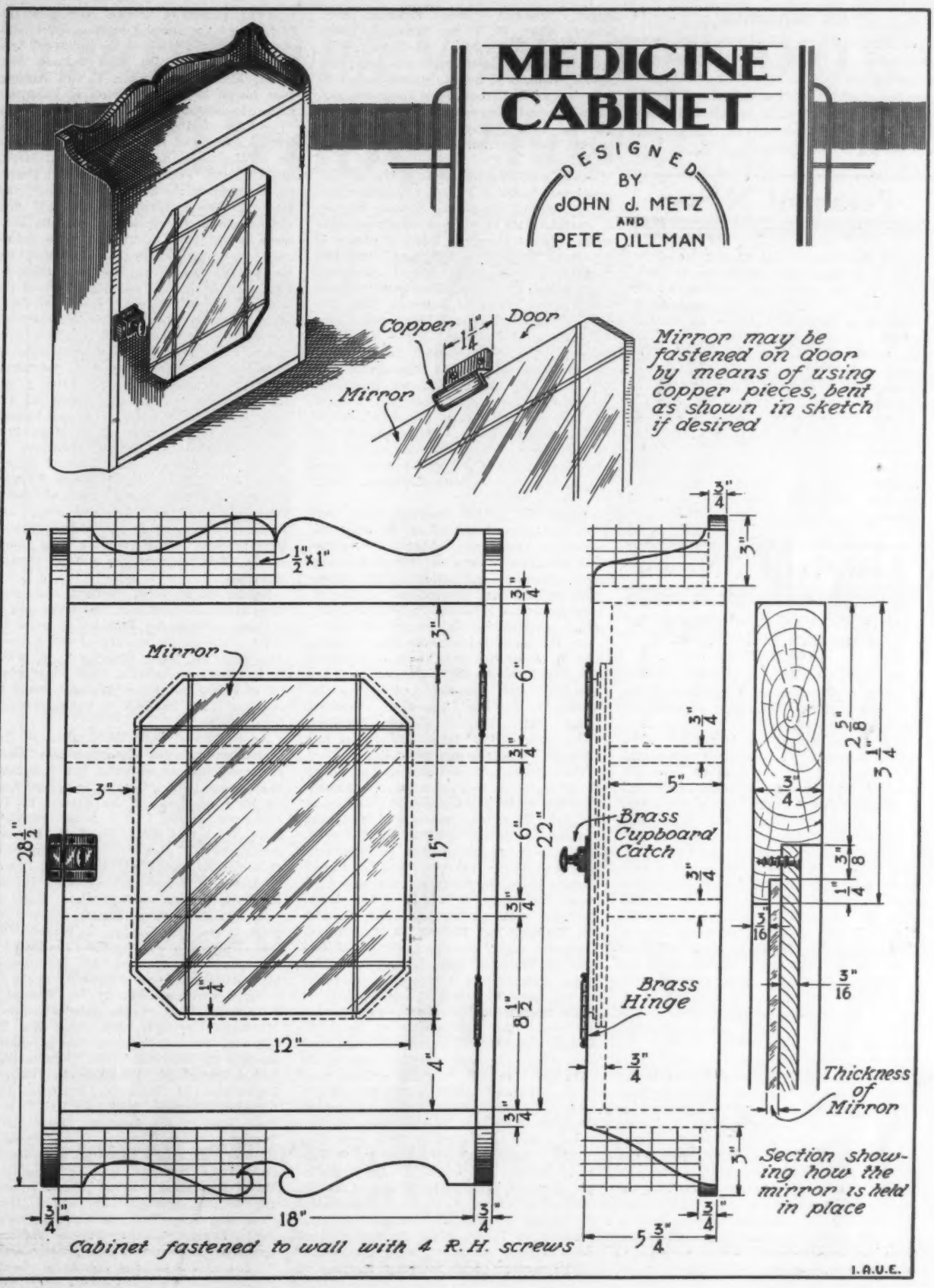
Submitted by Professor L. M. Roehl, Cornell University, Ithaca, New York


MEDICINE CABINET
DESIGNED BY JOHN J. METZ AND PETE DILLMAN
Copper
1 1/4"
Door
Mirror
Mirror may be fastened on door by means of using copper pieces, bent as shown in sketch if desired
1/2" x 1"
Mirror
3"
6"
15"
22"
28 1/2"
12"
8 1/2"
4"
18"
Brass Cupboard Catch
Brass Hinge
5"
5 3/4"
2 5/8"
3 1/4"
Thickness of Mirror
Section showing how the mirror is held in place
Cabinet fastened to wall with 4 R.H. screws
I.A.V.E.

AN OMISSION

In the article on "Graduate Work" appearing in the January, 1936, issue of this magazine the University of Missouri is not mentioned with the other institutions listed. Majors in advance work in industrial education under the leadership of Dr. Selvidge are offered at this university.

Personal News

¶ Dr. Franklin J. Keller, director of the National Occupational Conference in New York City, has resigned and returned to the principalship of the East Side Continuation School, from which he had been on leave of absence.

¶ Dr. Edwin A. Lee, superintendent of schools of San Francisco, Calif., has resigned to accept the directorship of the National Occupational Conference in New York City.

¶ Miss Florence M. Marshall, principal of the Manhattan Industrial High School for Girls, New York City, has received the medallion awarded annually by the New York State Vocational Association to the person rendering the most outstanding service to vocational education.

Association News

TENTH ANNUAL CONVENTION OF AMERICAN VOCATIONAL ASSOCIATION

December 4 to 7, 1935, Chicago, Ill., was the host to 2,400 or more members of the American Vocational Association who attended the annual convention.

It is impossible, of course, to give more than a mere sketchy overview of the program that was compressed into the space of three and one-half days by the ambitious educational leaders from that star convention city, Chicago.

The convention theme was "Vocational Education for a Better Balanced Life."

In the opening session of the convention, held at 8 p.m. Wednesday, in the grand ballroom of Hotel Stevens, William J. Bogan, Superintendent of Chicago's schools, greeted those who attended the convention. John W. Higgins, President of the Worcester Pressed Steel Company, Worcester, Mass., gave the main address. With the understanding of the veteran industrialist, he pointed out the importance of teaching the boys and girls of today all of the industrial-arts and vocational-education courses that the school curriculum can embody.

In the annual banquet, held at 6 p.m., Thursday, December 5, George P. Hambrecht, President of the American Vocational Association, presided. As in previous years, there was a record-breaking attendance. The main speaker of the evening was Dr. C. A. Prosser, Director of Dunwoody Institute, Minneapolis, Minn. In his usual forceful yet humorous manner, he told his audience of the close tie-up which he has been able to establish between his school and the industrial firms in his city. At this banquet life memberships in the American Vocational Association were presented to the following members from Chicago: H. H. Hagen, Principal, Crane Technical High School; Albert W. Evans, Principal, Tilden Technical High School; J. McCarthy, Principal, Washburne Continuation and Apprentice School; William J. Bogan, Superintendent of Schools; Carl B. Carlson, Shop Superintendent, Lane Technical High School; Charles E. Lang, Principal, Lane Technical High School; H. O. Meyers, Shop Superintendent, Tilden Technical High School.

Newly selected members from out of Chicago were: Lester B. Pollom, State Supervisor of Agricultural Education, Kansas; Stephen E. Patrick, State Director of Vocational Education, Maine; Homer J. Smith, Professor of Industrial Education and Verne C. Fryklund, Assistant Professor of Industrial Education, University of Minnesota, Minneapolis; William B. Morgan, teacher of Industrial Arts, Nokomis Junior High School, Minneapolis; John Robohm, Jr., Principal, Boys' Vocational School, Minneapolis; Dean Schweickhard, Assistant Superintendent of Schools and President of the Minnesota Vocational Association, Minneapolis; Roland M. Torgerson, Director of Industrial Education, Winona Teachers' College, Winona, Minn.; Charles Richard Turner, President, United Masons' Supply Co., Hartford, Conn.; Miss Alma Ganz McClymen, State Supervisor of Home Economics, Madison, Wis.

Besides the general meetings, there were numerous sectional meetings for the groups interested in agriculture, industrial arts, industrial education, commercial education, emergency education, and national youth adjustment, guidance and occupational adjustment, home economics, industrial arts, industrial education, rehabilitation and teacher training.

At the industrial-arts-education meeting, held in conjunction with those interested in agricultural, commercial, home economics, and industrial and part-time education, Dr. William T. Bawden, Dean of the Graduate School, State Teachers College, Pittsburg, Kans., spoke on the "Better Balancing of Life Through Training in the Hand Crafts."

The industrial-arts sectional meeting Friday morning at 9:30, was under the chairmanship of Verne C. Fryklund, Assistant Professor of Industrial Education, University of Minnesota, Minneapolis. At this meeting, Dr. Homer J. Smith spoke on the subject of "Industrial Arts in Its Service with Vocational Education." Thomas Diamond, Professor Vocational Education, University of Michigan, Ann Arbor, Michigan, spoke on "Industrial-Arts Curriculum Planning and Revision to Meet Social-Economic Needs," and V. L. Pickens, Supervisor of Industrial Arts, Kansas City, Mo., spoke on the subject of "Changing Viewpoints in Assignment of Industrial-Arts Teachers."

The meeting at 2 o'clock Friday afternoon was under the chairmanship of Frank C. Moore, Supervisor of Industrial Arts, Cleveland, Ohio. The topic for this meeting was "The Child of 1936," and the speakers were O. P. Schneider, Assistant Principal, Washburne Technical High School, Cleveland, Ohio; Dr. William E. Warner, Associate Professor Industrial Education, Ohio State University, Columbus, Ohio; George B. Cox, Professor Industrial Arts and Director Engineering Shops, Oregon State College, Corvallis, Oreg., and William J. Bogan, Superintendent of Schools, Chicago. E. E. Ericson, Director Division of Trades, State Teachers College, Santa Barbara, Calif., led in the discussion.

The meeting held Saturday morning at 9:30 was in charge of Marshall Byrn, Assistant Professor of Vocational Education, University of Michigan, and Head of the Industrial Arts Department, University High School, Ann Arbor, Mich. The speakers at this meeting were Joseph M. Speer, Director of Industrial Education, Pittsburgh, Pa. His subject was "The Place of Industrial Arts in the Junior High School." Earl E. Bedell, Assistant Director of Vocational Education, Detroit, Mich., spoke on the "Function of Shop and Drawing Programs in the Senior High School" and Harry E. Wood, Director of Practical Arts and Vocational Education, Indianapolis, Ind., spoke on the subject of "Designing for Industrial-Arts Projects Made Easier." At this time also Roy R. Van Duzee, Supervisor Industrial Arts, West Allis, Wis., made his report of the activities of the American Vocational Association Committee on Tests and Measurements in Industrial Arts. Dr. Homer J. Smith, Professor of Industrial Education, University of Michigan, led in the discussion. At the industrial-arts luncheon Saturday at 12:30 p. m., D. W. Castle, Vocational Director of the Township High School and Junior College, Joliet, Ill., was chairman. A. B. Mays, Professor Industrial Education, University of Illinois, acted as toastmaster. Emery T. Filbey, Dean of Faculties, University of Chicago, Chicago, Ill., spoke on the subject of "Public Support for Industrial Arts Instruction" and William T. Bawden, Dean, Graduate School, State Teachers College, Pittsburg, Kans., spoke on the "Reinforcements for a New Offensive Movement."

Besides the foregoing meetings, there were many others all exceedingly interesting and all of them well attended. Probably of special interest might be the meeting of the National Association of State Supervisors, at which P. L. Cressman, Assistant State Superintendent of Public Instruction, Michigan, made his report of the "Committee on Industrial Youth Organizations."

As customary, both the Epsilon Pi Tau Fraternity and the Iota Lambda Sigma Fraternity had an initiation and a banquet meeting during the American Vocational Association convention. At the Epsilon Pi Tau Fraternity banquet, Carl L. Adams, President, State Teachers College, De Kalb, Ill., was toastmaster. Dr. Homer J. Smith, University of Minnesota, spoke on "The Three Degrees in Industrial Education." Professor William L. Hunter, Iowa State College, spoke on "Questions Concerning Master's Degrees Programs," and Dr. William E. Warner, Ohio State University, was the discussion leader on the open forum question "Are We Developing a Racket?" A critical summary of the discussions was then given by Dr. Edward A. Fitzpatrick, Dean of the Graduate School, Marquette University, Milwaukee, Wis. The following new members were then introduced: Norman D. Anderson, Tilden Technical High School, Chicago, Ill.; John A. Backus, Director, Department of Education, American Type Founders, Elizabeth, N. J.; William T. Bawden, Dean of the Graduate School, State Teachers College, Pittsburg, Kans.; Daniel J. Crowley, Chairman, Industrial Arts Department, State University, Bowling Green, Ohio; Henry H. Hagen, Principal, Crane Technical High School, Chicago, Ill.; John J. Hatch, Chairman, State Teachers College, Newark, N. J.; Leonard J. Lease, Director Vocational Education, Harvey, Ill.; John J. Metz, Editor,

(Continued on page 6A)

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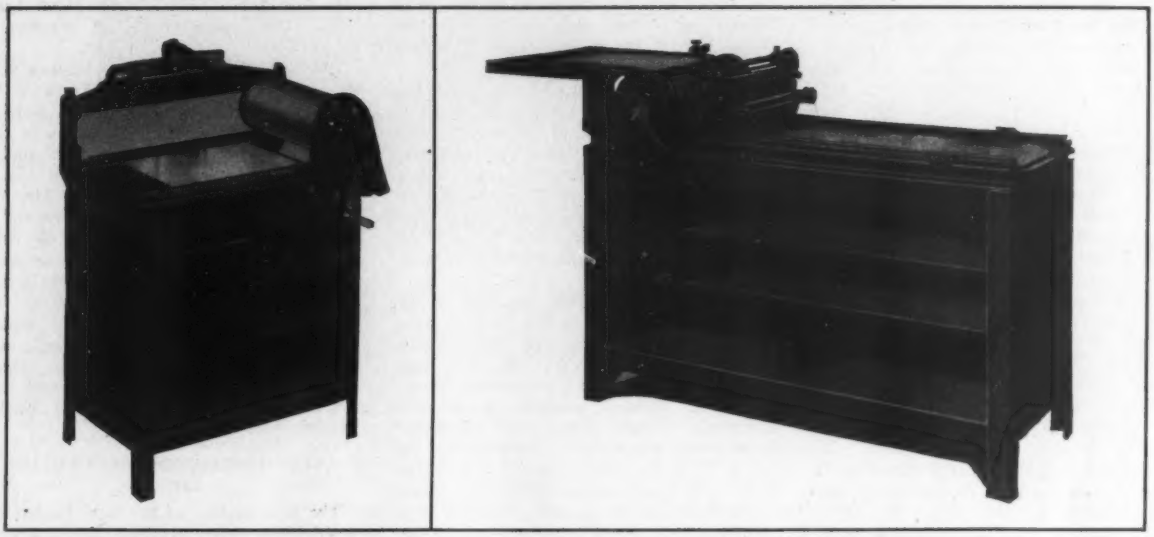

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(Continued from page 100)

INDUSTRIAL ARTS AND VOCATIONAL EDUCATION, The Bruce Publishing Company, Milwaukee, Wis.; Ralph L. Newing, Manager, Educational Department, International Textbook Company, Scranton, Pa.; Irving C. Perkins, Chairman, Industrial Arts Department, State Teachers College, Buffalo, N. Y.; George F. Weber, Director of Vocational Education, South Bend, Ind.

At this banquet, the Epsilon Pi Tau Fraternity established a new policy by giving laureate awards in recognition of outstanding work to members who have won national recognition for themselves in pursuits of organization procedure, public relations, or some other phase of the Fraternity program where research was an important factor in the work done. The following members were thus honored: Algot B. Anderson, Wilmington Trade School, Wilmington, Del.; Prof. L. F. Ashley, State Teachers College, Charleston, Ill.; O. B. Badger, Director of Industrial Arts, Tulsa, Okla. Charles F. Bauder, Director of Vocational Education, Philadelphia, Pa.; Earl L. Bedell, Director of Industrial Arts, Detroit, Mich.; John C. Beswick, State Director Vocational Education, Sacramento, Calif.; Clyde A. Bowman, Dean, Stout Institute, Menomonie, Wis.; Elmer W. Christy, Director Industrial Arts, Cincinnati, Ohio; Dr. Glen U. Cleeton, Carnegie Institute of Technology, Pittsburgh, Pa.; Professor George B. Cox, State College, Corvallis, Oreg.; Dr. L. A. Emerson, Director Y.M.C.A. Schools, New York City; Roy G. Fales, State Supervisor Industrial Arts, Albany, N. Y.; George H. Fern, Assistant State Superintendent Public Instruction, Lansing, Mich.; John E. Fintz, Supervisor of Vocational Education, Cleveland, Dr. Verne C. Fryklund, University of Minnesota, Minneapolis, Minn.; Professor O. A. Hankammer, State Teachers College, Pittsburg, Kans.; Professor DeWitt Hunt, A. & M. College, Stillwater, Okla.; H. H. Hutchinson, State School for the Deaf, Columbus, Ohio; Ray F. Kuns, Automotive Trade School, Cincinnati, Ohio; Frank C. Moore, Supervisor Industrial Arts, Cleveland, Ohio; Dr. L. V. Newkirk, Director Industrial Arts, Chicago, Ill.; Professor Milo T. Oakland, State Teachers College, DeKalb, Ill.; Professor Burl N. Osburn, State Teachers College, Millersville, Pa.; C. E. Partch, Dean, Rutgers University, New Brunswick, N. J.; Raymond W. Phipps, High School, Lake Forest, Ill.; Dr. Gerald G. Pugh, Director Poppenhusen Institute, College Point, N. Y.; Anthony T. Stavaski, State Teachers College, California, Pa.; A. C. Tagg, Director Industrial Education, Dearborn, Mich.; Dr. B. H. Van Oot, State Supervisor Industrial Education, Richmond, Va.; Gilbert G. Weaver, State Department of Education, New York City; Professor F. C. Whitcomb, Miami University, Oxford, Ohio.

The Iota Lambda Sigma Fraternity also had its banquet on Friday evening. Prior to the banquet, Waldo C. Wright, Manager, Special Course Division, International Correspondence Schools, Personnel Training Division, Scranton, Pa., and Dr. F. T. Struck, Head, Department of Industrial Education, Pennsylvania State College, State College, Pa., were inducted into the Grand Chapter of the fraternity as members.

President R. J. Green presided at the banquet. The speakers on this occasion were: Gilbert G. Weaver, supervisor of industrial teacher training, New York City, who spoke on "Leadership Through Iota Lambda Sigma"; Thomas H. Quigley, professor of industrial education, Georgia School of Technology, Atlanta, Ga., who spoke on "Standards," and Dr. J. C. Wright, commissioner of education in charge of vocational education in the United States, who gave an interesting account of his travels among the South American Indians.

New officers elected to guide the activities of the Grand Chapter for the coming year are as follows: President, Jerry Hawke; vice-president, Ben Harris; secretary-treasurer, G. H. Resides.

At the House of Delegates meeting the following men were elected as officers for the coming year: President, George P. Hambrecht, Madison, Wis.; vice-presidents, Thomas H. Quigley, Atlanta, Ga., H. A. Tiemann, Denver, Colo., Ray Fife, Columbus, Ohio, and R. L. Bynum, Nashville, Tenn.; executive secretary, L. H. Dennis, Washington, D. C., B. J. Knauss, Chicago, Ill., R. W. Selvidge, Columbia, Mo., and Miss Ruth Freeland, Lansing, Mich., were re-elected as vice-presidents for three-year terms.

MASSACHUSETTS INDUSTRIAL-EDUCATION SOCIETY MEETS

The annual get-together dinner of the Massachusetts Industrial-Education Society was held January 11, at the Hotel Lenox, Boston, with more than 125 members in attendance.

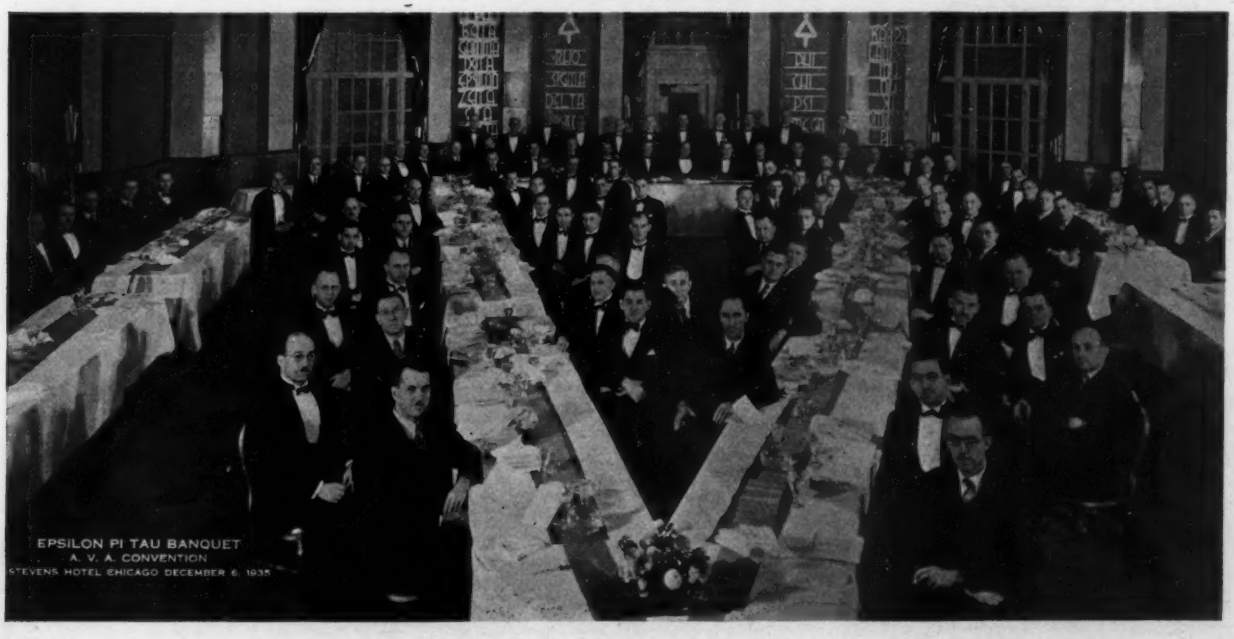
Following the dinner, a short business meeting was held, with President Louis A. Van Ham in charge. Mr. Frank Allen, state supervisor of vocational art education in business and industry, was the guest speaker. Speaking on the subject, "Industrial Art and Fine Art in Relation to Industry," Mr. Allen said that the American people have not yet grasped the opportunities which lie before them in the field of fine arts. He stressed the need of those in the field to be more modern in their productions and to keep away from bygone conceptions. Industry and business must co-operate, he said, if the people desire a change. Mr. Edward C. Emerson, director of manual arts in Boston, who followed, urged that all members join the New England Society. — *A. Irving Dodge.*

NEW ENGLAND ASSOCIATION MEETS

The first meeting of the New England Industrial-Arts Association was held November 29 and 30, at Fitchburg, Mass., with Dr. Charles M. Herlihy, of the State Teachers' College, in charge. The meeting was attended by 55 teachers of industrial arts from six states.

Mr. Ray Hudson, of the New England Council, gave a talk, and was followed by Dr. M. M. Proffitt, who discussed "Industrial Arts and the Youth Problem."

(Continued on page 9A)



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(Continued from page 6A)

A short business session was held, when reports of committees were read and approved. Officers were elected for the following year as follows:

President, Mr. Arthur Feuerstein, of Connecticut; first vice-president, Mr. Louis Van Ham, of Massachusetts; secretary, Mr. Willis B. Anthony, of Massachusetts; treasurer, Mr. Richard Ballau, of Rhode Island. Second vice-presidents elected were Mr. Edward Emerson, Mr. Henry Caswell, Mr. Charles Sawyer, Mr. Morris Varney, Mr. Everett Childs, and Mr. John Cave.—*Willis B. Anthony.*

KENT STATE UNIVERSITY EDUCATIONAL CONFERENCE

The Industrial-Arts Section of the Fifth Annual Kent State University Educational Conference held December 7, 1936, at Kent, Ohio, was attended by 42 educators from northeastern Ohio.

The program was as follows: Chairman, Hudson S. Martin; "Furniture Projects or Boy Interest Projects for Manipulative Experiences," C. C. Steele, Bedford, Ohio, Dwight Brocklehurst, Lorain, Ohio; "Textbooks and Reference Materials in Shop and Drawing Courses," Theodore Walters, New London, Ohio; "Conference on Content in Drawing," A. J. Spangler, Kent, Ohio.

The Conference was followed by a luncheon at which the subject "An Organization of Industrial-Arts Teachers of North Eastern Ohio" was discussed. A committee of three were elected to consider further the matter of such an organization and to arrange for a spring meeting of industrial-arts teachers of Northeastern Ohio when a detailed plan of organization will be presented.

The committee is as follows: Merle Legget, Assistant Superintendent of Medina County in charge of the supervision of Industrial Arts, Medina, Ohio; Mr. Martin Hudson, head of the Department of Industrial Arts, Fitch Township High School, Youngstown, Ohio, and Harry L. Wohlgamuth, Howland Township High School, Warren, Ohio.—*E. W. Tischendorf.*

SOUTH DAKOTA INDUSTRIAL-ARTS ROUND TABLE MEETS

The industrial-arts round table of the South Dakota Education Association held its annual meeting November 25 and 26, in Mitchell. The meeting attracted the largest attendance in the history of the organization.

During the session, plans were made for the adoption of a five-year program for the further development of industrial arts in South Dakota.

At the business session, officers were elected for the next year as follows:

President, Mr. F. H. Frick, Mitchell; vice-president, Mr. C. R. Wells, Yankton; secretary-treasurer, Mr. E. A. Juhl, Watertown. —*William W. Wills.*

CENTRAL CONNECTICUT ASSOCIATION MEETS

The Central Connecticut Industrial-Arts Association held a meeting on December 4, in Meriden, with 44 members present. Mr. Eugene Giammatteo, of Bristol, acted as chairman.

Following a dinner at 6:30 p.m., a number of talks were given on various phases of safety instruction. A short business meeting was held, with President William F. Moran, of Waterbury, presiding. Mr. John Conroy, of Meriden, gave a report of the proceedings at the Fitchburg meeting of the New England Industrial-Arts Association. A committee was appointed to study the matter of dues and prepare a report for submission at the next meeting. A decision was reached on the dates for the state conference, to be held on April 17 and 18. The meeting adjourned at 10:15 p.m.—*Harry A. Barnicle.*

OHIO INDUSTRIAL-ARTS TEACHERS MEET

The department of industrial arts of the Ohio Education Association held a meeting on December 27, with a program centered around the theme, "Industrial-Arts Programs in the High Schools."

Mr. L. W. Reese, of the State Department of Education, opened the session with an address on the topic, "Industrial-Arts Programs in the Smaller High Schools." Prof. E. W. Bollinger, of the University of North Dakota, talked on "Experiments in the Enrichment of Industrial-Arts Programs." Mr. George C. Beery, of Columbus, closed the morning session with a talk on "A Technique for Appraising Progress in the Industrial Arts."

Following the morning session, a luncheon program was held, with President Hauenstein presiding. Supt. Edward D. Roberts, of Cincinnati, speaking on the topic, "Citizenship in

(Continued on page 10A)

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(Continued from page 9A)

a Changing World," made it clear that industrial arts today should concern itself with citizenship problems related to industry, not limiting its activities to laboratory experiences alone. Dr. Nat T. Frame, of the CCC staff, spoke briefly on phases of the industrial arts. Mr. Frank C. Moore, of Cleveland, commented briefly on the highlights of the Nashville convention of the Western Arts Association to be held in April.

At the afternoon session, the group listened to a talk by Dr. Franklin J. Keller, of New York City, on the subject, "Vocational Education in Foreign Countries and the United States."

The state committee on industrial arts suggested that a contribution be made by a representative of the committee before the administrative section of the Ohio Education Association. Dr. William E. Warner, who accepted the task, gave a talk on the topic, "Saving Youth Through Enriched Industrial-Arts Programs in Ohio."

At the business session, the association elected the following officers for the year:

President, Mr. Lewis J. Tipton, Newark; vice-president, Mr. Gerald D. Bowen, Van Wert; secretary, Mr. Clarence D. Bateman, Columbus.

The state committee, composed of Mr. Elmer W. Christy, Cincinnati, Mr. Frank C. Moore, Cleveland, Dr. William E. Warner, Columbus, and Prof. Fred C. Whitcomb, Oxford, was continued for another year.—*Clarence J. Bateman.*

WESTERN ARTS ASSOCIATION CONVENTION

A joint meeting of the Western Arts Association and the Southeastern Arts Association will be held April 1–4, at Nashville, Tenn. Nashville is a delightful city of homes and schools and of historic points of interest. It is an educational center and is the home of three past presidents of the United States.

The local committee on arrangements, of which Mr. George Dutch is chairman, is completing plans for the meeting. The outline of the tentative program contains many attractions of interest to teachers in the fields represented by these two associations.

Opening with group meetings on April 1, the art section will discuss "Working Together in Art Education." At the same time the industrial-arts and home-economics groups will meet. There will be two general sessions, and a number of sectional meetings have been planned. Among the speakers on the program are Mr. Arthur A. Morgan, Supt. D. Harry Clark of Knoxville, Tenn., Dr. Hollis L. Caswell of Peabody College, Mr. Leon L. Winslow of Baltimore, Md., Miss Beatrice L. Harrison of Detroit, Mich., and Miss Mary McKinnon, of Chicago, Ill.

The entertainment committee has arranged a number of trips to interesting historic places in the vicinity.

Arrangements also have been made for an extensive exhibit of school supplies and equipment. Miss Grace Sobotka, chairman of the educational exhibits committee, is located at Peabody College, Nashville, Tenn.

Information concerning the program and the speakers can be obtained by writing to Mr. Harry E. Wood, secretary, 5215 College Ave., Indianapolis, Ind.

NATIONAL EDUCATION ASSOCIATION CONVENTION

At the annual meeting of the Department of Superintendence, to be held at the National Education Association convention at St. Louis, Mo., the department of supervisors and directors will have a panel discussion on the arts, on Monday, February 24, at 9:30 a.m. Dr. William E. Warner of Ohio State University, Columbus, Ohio, will be chairman on this occasion. The subject for discussion will be "The Improvement of Instruction in Fine and Industrial Arts." The personnel for the panel will consist of: Lawrence F. Ashley, Director of Industrial Arts, State Teachers College, Charleston, Ill.; Charles A. Bennett, President, The Manual Arts Press, Peoria, Ill.; Victor D'Amico, Fieldston School of Ethical Culture, New York City; George F. Frasier, President, State College of Education, Greeley, Colo.; Otto A. Hankammer, Professor of Industrial Arts, State Teachers College, Fitchburg, Mass.; DeWitt S. Hunt, Director of Industrial Arts, A. & M. College, Stillwater, Okla.; Hugh M. Newman, Managing Director, Chicago Academy of Fine Arts, Chicago, Ill.; Felix M. Payant, Professor of Art, Ohio State University, Columbus, Ohio; Maris M. Proffitt, Educational Consultant and Specialist in Guidance and Industrial Education, Washington, D. C.; Elizabeth Wells Robertson, Director of Art,

(Continued on page 13A)

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(Continued from page 10A)

Chicago Schools; William H. Varnum, Director of Art Education, University of Wisconsin, Madison, Wis.; Jane Betsey Welling, Professor of Art, Wayne University, Detroit; Walter R. Williams, Graduate Fellow in the Arts University of Minnesota High School, Minneapolis, Minn.

During this meeting also, members of the Epsilon Pi Tau Honorary Fraternity will hold an informal dinner conference on industrial arts. It is estimated that 55 or more members of the Fraternity live within a 150-mile radius of St. Louis so that a good attendance at this, the second Epsilon Pi Tau program to be held at a National Education Association convention, will not be lacking.

JUNIOR-HIGH-SCHOOL CONFERENCE

The twelfth annual junior-high-school conference will be held on Friday and Saturday, March 13 and 14, at the School of Education, New York University, in New York City. This conference, which is sponsored by the New York University, will be divided into two general sessions and eighteen panel groups, in which more than two hundred persons will take part. There will be an exhibit of the work of junior-high-school students on Saturday, March 14.

Arrangements for the meeting are in charge of Mr. Samuel J. McLaughlin, chairman of the conference.

INDIANA INDUSTRIAL-EDUCATION ASSOCIATION CONVENTION

The Indiana Industrial-Education Association will hold a meeting on March 27 and 28, at Fort Wayne, with Mr. S. A. Yager, of Terre Haute, in charge.

Dr. Melvin S. Lewis, of Indiana University, will address the meeting on the subject, "The Relationship of Industrial Arts to Experimental Organizations of the School System."

Information concerning the meeting and the speakers may be obtained from Mr. H. G. McComb, secretary, Purdue University, West Lafayette, Ind.

OSWEGO NORMAL BOYS' CLUB MEETS IN NEW YORK CITY

The thirty-sixth annual round-up and dinner of the Oswego Normal Boys' Club will be held March 14, at the Hotel Lincoln, in New York City.

Information concerning the program and the speakers may be obtained from Mr. Walter D. Church, secretary of the Club, 20 Lawton Ave., Cliffside Park, N. J.

NEBRASKA INDUSTRIAL-ARTS TEACHERS MEET

The industrial-arts teachers of District No. 4, of the Nebraska Teachers' Association held a meeting on February 15, at Overton. Approximately thirty members were in attendance.

The association has recently become affiliated with the State Teachers' Association and with the Department of Superintendence. At its March meeting the association will conduct a round-table discussion on the general shop.

At the business session, the association elected officers for the next year as follows:

President, Mr. W. W. Little, Hastings; vice-president, Mr. Donald Bryant, North Platte; secretary, Mr. Otto Means, Grand Island.—*Gale Simmons.*

FEDERATED COUNCIL ON ART EDUCATION

At the eleventh annual meeting of the Federated Council on Art Education, held in New York City recently, the following officers were elected for 1936:

President, Mr. Royal B. Farnum, Providence, R. I.; vice-president, Mr. Raymond P. Ensign; secretary, Mr. Leon L. Winslow, Baltimore, Md.; treasurer, Mr. James C. Boudreau, Pratt Institute, Brooklyn, N. Y.

School-Shop Equipment News

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(Continued on page 15A)

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(Continued from page 13A)

sturdy and compact, and the design is such that the machine can be set against the wall, using only a small amount of floor space. The feeding operation is convenient, good contact is automatically assured, and the making of the prints is a continuous operation.

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NEW ATKINS BLUEBOOK OF SAWS

The E. C. Atkins Company, 404 South Illinois St., Indianapolis, Ind., has announced its new Catalog No. 21 for 1936.

The latest catalog of the firm, which takes the form of a bluebook of saws, contains descriptions, specifications, and data which are suggestive for prospective buyers of saws. The catalog is divided into 13 major departments, with full department index at the beginning of each chapter. The booklet is bound in stiff board cover, in attractive blue, gold, and buff colors.

A copy of the catalog will be sent to any school shop instructor who will write for it.

ISSUE NEW SHOP BOOKLETS

The South Bend Lathe Works, at South Bend, Ind., has recently issued two shop booklets as aids to school-shop instructors and supervisors.

The booklets are intended to acquaint shop instructors with the latest improvements in school-shop equipment. One of the booklets, *Modern School Shops*, presents interesting views of vocational departments in a number of schools and indicates the kinds and sizes of machinery considered most practical for students in machine-shop classes. A second booklet, *The School Shop*, contains illustrations, layouts, types and quantities of equipment necessary for machine shops in trade and vocational schools, junior and senior high schools, and general farm shops.

Copies of these booklets may be obtained free of charge by writing to the South Bend Lathe Works at South Bend, Ind.

New Publications

Leisure Time Bibliography
By Fred J. Schmidt. Paper, 8¼ by 10⅝, 84 pages, mimeographed.

Buyer's Guide
By Raymond W. Burgett. 10½ by 8¼, 35 pages, mimeographed.

A Guide of Metalworking Problems
By Amos G. Williams. 10½ by 8¼, 28 pages, mimeographed.

Keene's Cement Craft
By Everett G. Livingston. Paper, 10½ by 8¼, 49 pages, mimeographed.

Saws, Proverbs, and Maxims
By William L. Hunter. 10½ by 8¼, 11 pages, mimeographed.

Theses Pertaining to Industrial Arts Education
By William L. Hunter. 10½ by 8¼, 18 pages, mimeographed.

All of the foregoing six booklets have been prepared under the direction of Professor William L. Hunter of the Industrial-Arts Department, Iowa State College, Ames, Iowa. The material is very much worth while to industrial-arts teachers. While no prices have been stated for these various booklets, they can by no means be furnished gratis. Those who are interested enough to write for them should be prepared to pay a substantial price for them. They are worth it.

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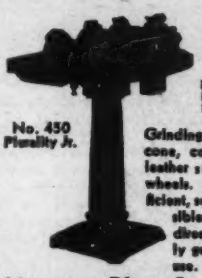

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INDUSTRIAL ARTS and VOCATIONAL EDUCATION

Vol. 25
No. 4

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CONTENTS

Analysis of Architectural Drafting, *by H. D. Campbell*..... 101
Industrial-Arts Work in the Lower Grades, *by G. H. Snaddon*..... 103
Analysis of Senior-High-School Mechanical-Drawing Texts, *by D. W. Brown*..... 110
Artistic Wrought-Iron Work — VI, *by C. Weiler and Karl Ufer*..... 113
Editorials 114, 115
Casting in the School Shop — V, *by N. A. McMillan*..... 116
A Marblehead-Class Sailing Sloop, *by Claude Wm. Horst*..... 117

Supplement

Artistic Wrought-Iron Work, *by C. Weiler and Karl Ufer*.....No. 325

Problems and Projects

An Electric Stove, *by E. A. Rerucha*..... 122
Metal Wall Plaque, *by Paul Marschner*..... 123
Rebuilding Hammer Edges with Oxyacetylene Torch, *by E. D. Soderstrom*..... 123
Modernistic Wastebasket, *by A. M. Helgerson*..... 125
A Memo Pad, *by Wayne S. Scott*..... 125
Electric Candle, *by Leonard Wright*..... 125
Tool and Hardware Cabinet, *by C. M. Jochem*..... 126
A Dinner Chime, *by E. LeRoy Longley*..... 128
The Mortise-and-Tenon Joint — VI, *by John E. Doren*..... 129
Testing the Knowledge of Proofreaders' Marks, *by Clifford K. Lush*.. 130
Indian Gourd Rattles, *by W. Ben. Hunt*..... 131
Bench Tool Holder, *by Gerald L. Waltrip*..... 132

Posters

Sympathy, *by Louis M. Roehl*..... 129
Courtesy, *by Louis M. Roehl*..... 130

Personal News..... 133
Association News..... 133
New Publications..... 134
School-Shop Equipment News... 11A

OF SPECIAL INTEREST IN THIS ISSUE

The reader's attention is called especially to the following articles which appear in this issue.

Teachers of architectural drawing will be interested in the "Analysis of Architectural Drafting" worked up by the Illinois Drafting Research Committee, and in the "Analysis of Senior-High-School Mechanical-Drawing Texts" by D. W. Brown.

Shop teachers may get a lot of inspiration out of Snaddon's "Industrial-Arts Work in the Lower Grades."

Teachers interested in model-boat building will be delighted with Horst's "Marblehead-Class Sailing Sloop," the first part of which is appearing in this issue.

IMPORTANT CONVENTIONS

Again the attention of teachers of industrial arts and vocational education is called to the following important conventions.

The Indiana Industrial Education Association, S. Yager, President, will hold its annual meeting at Fort Wayne, Ind., March 27 and 28. A combined convention will be held by the Western Arts Association, F. C. Moore, President, and South Eastern Arts Association, Mrs. W. L. Wheeler, President, at Nashville, Tenn., April 1 to 4.

The Eastern Arts Association, Walter H. Klar, President, will hold its meeting at New York City, April 15 to 18; and the Michigan Industrial Education Association, D. B. Fox, President, will meet at Jackson, Mich., April 23 to 25.

THIS MONTH'S COVER

The cover picture this month shows one of the students of the State Teachers College, California, Pa., working at a shaper in the machine shop.

S. L. Coover is the director of the industrial-arts department at that school.

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Editorial Contributions—The Editor invites contributions bearing upon Industrial Arts, Vocational Education, and related subjects. Manuscripts, drawings, projects, news, etc., should be sent to the Publication Office in Milwaukee. Contributions are paid for at regular space rates. In all cases manuscripts should be accompanied by full return postage.
The Magazine is on sale at Brentano's, New York; Wanamaker's, Philadelphia; Brentano's, Chicago; Philippine Education Co., Manila, P. I.

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